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OFFICE AUTOMATION

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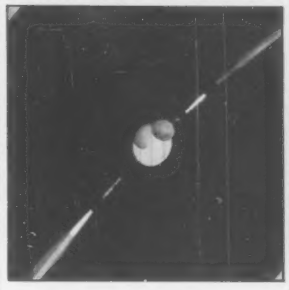

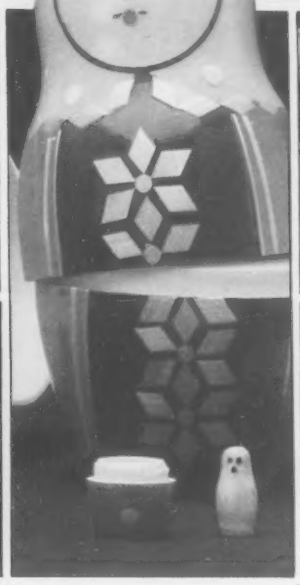

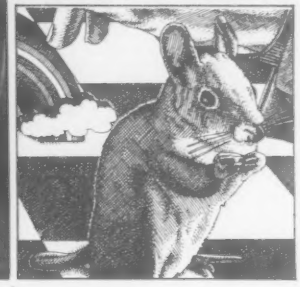

Linking time-tested existing systems to the new developing technologies may be the most effective way to implement OA in your organization.
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COMPUTERWORLD
OA

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COMMENT

A lot of people are missing the boat on office automation. Whether it's despite all the hype or because of it, too many people are confused, unaware or misled in the area of OA. Some have only a vague, general idea of how to automate office procedures and an even more vague idea of what's supposed to happen when these procedures are automated. Others think OA is really part of communications, which shows a lack of understanding of both communications and office technologies. Communications technologies are needed to integrate office technologies; they act as a catalyst, certainly. However, just as telecommunications includes more than the office, so does OA encompass a great deal more than communications.

Still others view OA as a specific technology or group of products — for example, microcomputers. These people are not seeing the forest for the trees, however, and are missing what's happening in terms of real, long-lasting changes in organizations around the country.

Office automation — end-user computing — is spreading into every office. There is no getting away from it. At an earlier time, employers found it difficult to accept the idea of air conditioning offices to encourage greater productivity among employees, but now it is a forgone conclusion. Similarly, the telephone was originally a user-unfriendly device with not enough people "on line;" now times have changed, and the telephone is a predetermined necessity in home and office — sometimes even in car or plane. So is office automation. So is the widespread use of computing technologies in the everyday jobs of noncomputer people.

As computer literacy rises, as computer transparency increases and as information demand magnifies, employees in every office will be working with automation.

It is essential to realize that OA is a process, not only a combination of products. It is an evolving force reshaping the manner in which organizations conduct their business. This kind of change is not going to happen overnight or even in a 12-month span. What is occurring is widespread organizational change that is going to affect everyone. In organizations like banks or insurance companies, it would be impossible to conduct business by other than automated means; soon it will be just as unthinkable for other kinds of organizations not to use automation in order to maintain a competitive advantage. People won't be adopting OA all at once. But even though it may be a slow transition, it is an inevitable one.

LETTERS

More Etiquette

I found your article on electronic mail etiquette ["Forum," CW OA, Aug. 17] interesting, although I do have a few suggestions of my own to add.

Our electronic mail system offers options to both answer and forward any responses to messages received.

The "answer" capability does not repeat the original message, whereas the "forward" capability does. If the receiver would like to respond with a simple answer, such as yes or no, using the forward feature is recommended.

Even if, as suggested in your article, the original sender has kept a copy of the messages he has sent, it still may be difficult to figure out what question is being answered. Perhaps several have been asked.

Electronic messaging is more appropriate for contact outside one's immediate work area. Personal contact remains effective for the person sharing your office or one nearby, especially if a prompt reply is needed.

New users seem particularly prone to frivolous messages. They should be cautioned to resist this. Users who have found electronic mail an effective tool will resent the sudden intrusion of numerous messages like, "Hi, how are you? I just got on the electronic mail system."

I hope you will find these thoughts useful.

Lorie Strong
Western Electric Co.
Bellaire, Texas

Not Overkill

Congratulations on the August 17 issue of *Computerworld OA* — well written, informative and worthwhile. Articles I thought particularly excellent were the Toffler interview, "Conquering Microphobia," "Protecting Your Data" and "The Micro/Mainframe Link."

I disagree with reader Eugene Smith's assessment [CW OA, Aug. 17]. A dozen or so short articles, with summaries and good highlighting is not "information overkill."

It's very easy for the reader to pick and choose.

Michael H. Agranoff
Data Security Administrator
The Hartford Insurance Group
Hartford, Conn.

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THIS IS A BEAUTIFUL CHART, STANLEY.
NICE LINES, LIVELY COLORS—A REAL WORK OF ART, STAN!
I CALL IT "ELECTRONIC IMPRESSIONISM."
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If so, write and tell us. If not, tell us about that, too. Send comments to The Editor, *Computerworld OA*, Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

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NEWSBRIEFS

LOWELL, Mass. — Wang Laboratories, Inc. has signed a $10 million agreement with Boston-based Bolt Beranek & Newman, Inc. to design and build a wide-area network, or a system to link its computers over phone lines. A packet-switching system capable of handling wide-area networking will be set up in 199 cities next year, according to a Wang spokesman.

The agreement apparently ends speculation that Wang was interested in purchasing a company that could provide them with wide-area network capabilities. Shortly before this agreement, Wang purchased 530,800 shares (or about 6%) of Tymshare, Inc., the Cupertino, Calif., company that links computers in different cities.

Wang then sold the shares on the open market, earning $4.3 million in the transaction as a result of a rise in the value of the stock caused by anticipation that Wang might acquire the company.

HAYWARD, Calif. — The Osborne Computer Corp. has filed for bankruptcy after a meteoric rise within the computer industry. Osborne laid off virtually its entire work force, which had peaked at more than 1,000 in April 1983. This followed an unsuccessful search for an organization to acquire the firm before it filed for Chapter 11 in Oakland, Calif.

The financial decline of Osborne was swift. A pioneer in the portable computer field, Osborne had reportedly sold $100 million worth of its portables in 1982 and was viewed as a darling in the industry. Sales dropped dramatically, however, in early 1983 when a promised new product was not delivered and the portable computer field became crowded with competitors like Kaypro, Inc. and Compaq Computer Corp. with its IBM-compatible machine.

Osborne's financial woes increased when a $4.5 million law suit was brought against it by two Silicon Valley computer-parts makers, Testology, Inc. and PH Components, Inc., both of San Jose.

The suit charged that Osborne failed and refused to pay for certain computer circuit boards, disk drives and other computer component parts.

KANSAS CITY, Mo. — "Word processing is not a monolithic phenomenon which bodes either all evil or all good for all secretaries. Some people will profit enormously by automation, while others will suffer greatly."

This and other significant points were made at a two-day symposium, Secretary Speakout '83: The Professional Secretaries International (PSI) Research and Education Foundation, in Boston last March. A 20-page digest of that event is now available from PSI.

The digest covers such issues as implementation of office automation, the secretary's role in evaluating and recommending equipment and the restructuring of jobs. The report is available for $2 from PSI, 2440 Pershing Road, G-10, Kansas City, Mo. 64108.

DALLAS — VMX, Inc., the Richardson, Texas-based voice message communications maker, has filed suit against Voicemail International of Santa Clara, Calif. and Voicetek Corp. of Newton, Mass., for alleged infringement of the patent on VMX' Voice Message Exchange system. The Voice Message Exchange system, reportedly the original digital voice store-and-forward system, was invented by VMX' chairman and founder, Gordon Matthews.

VMX is aggressively defending its patent, the company said, and has previously filed a similar suit against Commterm, Inc. That suit was settled by the granting of a royalty-bearing license on the VMX patent to Commterm.

WASHINGTON, D.C. — Federal spending for information technology in 1983 will top $25 billion, according to a report from the International Data Corporation (IDC). In the report "Federal Market Spending Analysis: 1983-1985," IDC predicts a 20% annual compounded growth rate in the federal market for information technology.

Of the $21 billion spent in 1982, $9.1 billion was spend on facility management, $7.8 billion on telecommunications and $3.6 billion in DP equipment and services.

The report is available for $995 from IDC's Federal Division, Suite 240, 1500 Planning Research Drive, McLean, Va. 22102.

NORWALK, Conn. — Bitter competition and "kamikaze" pricing wars are forecast in the portable and transportable computer markets. This is the prediction of a 215-page report from International Resource Development, Inc. (IRD), a Norwalk market research firm.

The report said that "at least half of the current manufacturers of portables will be acquired, out of business or in niche markets within three years."

The report is available for $1,650 from IRD, 30 High St., Norwalk, Conn. 06851.

LOWELL, Mass.— Wang Laboratories, Inc. has acquired Dictronics Publishing, Inc., the software publisher of the Random House and Oxford dictionaries and *Roget's International Thesaurus*. The acqui-

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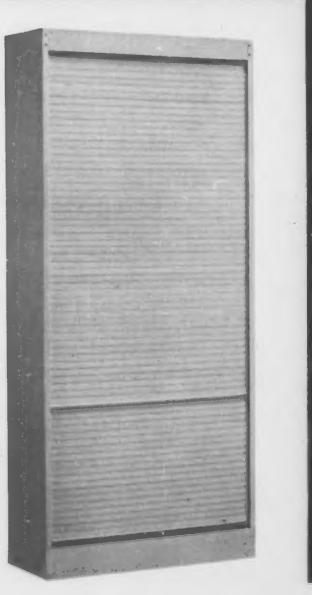

NEWSBRIEFS

sition was accomplished through the merger of Dictronics with a wholly owned subsidiary, Wang Electronic Publishing.

Wang said it plans to use the acquisition in future product offerings in order to allow office systems to use sophisticated software programs that will correct spelling and grammar or write business letters. Wang now holds exclusive electronic publishing rights to all editions of the *Random House Dictionary*, the *Concise Oxford Dictionary of English*, *Roget's International Thesaurus* and many other reference journals. Wang plans to sell rights to the reference software to other computer manufacturers.

For more information, contact Wang Laboratories, Inc., One Industrial Ave., Lowell, Mass. 01851

MAYNARD, Mass.— Digital Equipment Corp. and Trilogy Limited have entered into a joint agreement in which DEC has agreed to acquire an option to license advanced semiconductor technology from Trilogy.

DEC also agreed to acquire preferred stock in Trilogy representing a 9% equity interest in the new company. Digital will pay $25 million for the stock and the license option.

The announcement was made by Ken H. Olsen, president of DEC and Dr. Gene Amdahl, chairman of Trilogy Limited.

SANTA MONICA, Calif.— By 1986, more than 4.4 million displays and personal computers will be used to generate business graphics, according to a recent study by the International Data Corp.'s (IDC) Pacific Technology Center. The IDC report, "Trends in Computer Generated Business Graphics," pointed out that applications for computer-generated business graphics range from personal decision support to publication-quality presentation.

Leading users report that decision support and internal presentations represent the major motivation for use of computer-generated business graphics and that top and middle managers are the major users of graphics, according to IDC. The report is available for $2,500 from IDC's Pacific Technology Center, Suite 101, 1448 15th St., Santa Monica, Calif. 90404.

CUPERTINO, Calif.— Hewlett-Packard Co. has signed an agreement with Intecom, Inc. to cover certification of HP 3000 business computers and HP data terminals for interconnection through Intecom private branch exchanges (PBX).

The accord with HP is to include Intecom's IBX Integrated Business Systems, which can provide voice and data services for up to 12,000 users in a single monolithic system.

HP has recently announced similar certification agreements with Northern Telecom, Inc. and Rolm Corp. and has said other leading telecommunications firms will be involved in certification testing.

MEDFORD, N.Y. — Applied Management Services, a consulting and publishing firm specializing in IBM hardware and software, has published "Inside IBM." The 142-page study reportedly analyzes the latest products, services and strategies IBM is planning to implement for the '80s.

Among the topics covered are IBM's new organizational structure, IBM and AT&T, IBM's technical advances and new price strategies.

The report costs $90 from Applied Management Services, Box 350, Medford, N.Y. 11763.

WILLOW GROVE, Pa. — Although managers are most concerned with justifying and implementing office automation systems, employees are concerned more with how automation directly affects them and their work. This is the finding of a 132-page study, "The Office Revolution: Strategies for Managing Tomorrow's Work Force," conducted by Dr. Harold T. Smith for the Administrative Management Society.

The report by Smith, a professor at Brigham Young University, was the first of a four-part research project sponsored by the Administrative Management Society Foundation. In that report, Smith surveyed more than 4,000 managers, authorities and employees to provide information about managing human resources in the office of the 1990s.

The second part of the foundation's research project has just been launched. That report, which will focus on key environmental factors affecting the productivity of the office work force, is being conducted by Wilbert O. Galitz, a consultant specializing in human factors in the office.

The Smith report is available for $14.95 from the Administrative Management Society Foundation, 2360 Maryland Road, Willow Grove, Pa. 19090.

PLYMOUTH, Mich. — As micro technology speed and applications increase, the need for enhanced security of these systems will also increase.

To meet this need, Computer Protection Systems, Inc. has published a special report, "Managing Microcomputer Security," a 190-page report covering a wide variety of security of microcomputers in the business environment.

The report is available for $25 from Computer Protection Systems, Inc., 711 W. Ann Arbor Trail, Plymouth, Mich. 48170.

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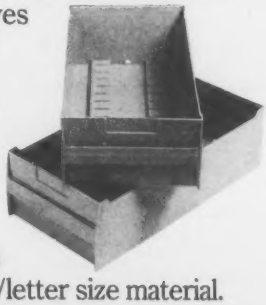

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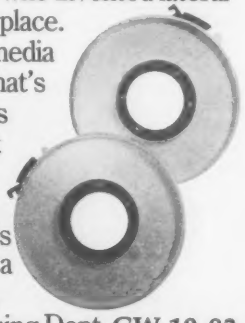

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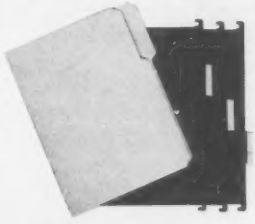

Supreme Equipment & Systems Corporation

Innovation is what makes Supreme supreme.

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Whether you realized it or not, this is the PC local network you've been holding out for.

Let's face it. If you manage the information systems in your company, you're one of the few people with enough foresight to ask the really tough questions about shiny new PC enhancements and capabilities.

So when your personal computer users started clamoring for a local network, we know just what you said.

"What about data integrity? Why do we have to commit to so much at once? Is it easy to expand the network?"

You probably even asked about multi-vendor compatibility and, as far as your personal computer users are concerned, a lot of other silly questions.

The sensible solution. Ethernet.

Considering the slow, proprietary networks put out for PCs, it's no wonder you held out for a more sensible solution.

And now it's here. EtherSeries: a family of integrated hardware and software local networking products specifically designed for personal computers. It's available right now for the IBM PC, with Apple and other popular personal computers not far behind.

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Blessing Or Burden?

What effect is OA having on jobs? How do workers themselves feel about the technology?

By Glenn Rifkin

Perhaps nothing in the computer industry has stirred up as much discussion as office automation. The technical issues, in themselves a subject for intense debate, are but a small fraction of the moral, social and humanistic questions being raised about the office of the future.

As vendors laud their products and businesses search for more efficient pathways to the bottom line, the office worker, the key player in this drama, is often lost in the resulting shuffle. However, that seems to be changing. Although technology has clearly found an irreversible place in today's office, the concerns of the office workers themselves are being trumpeted loudly by labor unions, trade organizations and the national press.

To some, OA represents a major threat to office workers, women in particular. Office systems have been accused of taking away jobs, deskilling

job functions and being the cause of several serious health hazards. Others look at OA as the salvation for organizations mired in paperwork and bureacratic communication breakdown. Office automation, they say, will create greater efficiency and save millions of dollars in the process.

As usual, the truth lies partially on both sides of the fence. Secretaries, clericals and typists — a group traditionally without a voice in management decisions — have either embraced the new technology as a welcome aid or have resigned themselves to yet another obstacle in their already tenuous career paths. It is clear that, love it or hate it, OA is a now a reality, and office workers have little hope of stopping it. It is also clear that the success of automating the office depends not on the machines themselves, but on how management and the DP department handle implementation, training and support.

Karen Nussbaum, director of 9 to 5, the National Association of Working Women, has been outspoken on the office workers' role in OA. The major concerns fall into two categories: the design of the machine and the design of the job. The design of the machine, critical to the worker's health and safety the worker, is a solvable problem, she said. Nevertheless, it is serious, because the problems "are not being corrected." CRTs have been accused of causing eye problems, backaches and neckaches, headaches and, possibly, birth defects.

Nussbaum pointed out that a recent National Research Council report (sponsored by the National Institute for Occupational Safety and Health [Niosh]) absolved CRTs of causing serious eye problems. The report concluded that about 40% of the machines on the market are now ergonomically correct for use. "That leaves the majority that aren't," Nussbaum stated.

Along with the labor unions, 9 to 5 has been accused of using the OA issue as a recruitment tool to unionize office workers. Lynn Stern, director of member services for the Computer and Communications Industry Association, claimed that the unions play on the fears of office workers who may not have a great store of knowledge about CRTs. "People are becoming frightened when there is no real cause for fear. No one has demonstrated any long-term ill effects from CRTs," Stern said. "From what I've read, you'd think backache was introduced into the work place by the CRT."

Though the health effects of CRTs continue to generate controversy, the more serious problem is the design of the job, Nussbaum said. Automation has lead to the reorganization of work along the lines of the factory model of the past. "Jobs that used to have variety and some exercise of judgment — and I mean even the very low-level clerical jobs — are now being broken down into their smallest possible components. New jobs are being created that repeat one task over and over again," she remarked.

Proponents of OA, like DeAnne Rosenberg, a management training consultant in Lexington, Mass., believe better jobs have been created. They argue that, far from being a threat, advances in technology are freeing office workers to take on greater responsibility in their jobs. "Some people are afraid and intimidated by the technology, but the vast majority love it. It takes away the scut work and gives people time to handle more challenging projects," she pointed out.

Recent office worker surveys tend to back up a positive outlook on OA. Kelly Services, the Troy, Mich., temporary agency,

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has published "How Office Workers View Automation," a survey of nearly 500 office workers in Fortune 1300 firms. According to the Kelly report, three-quarters of the respondents felt their new skills enabled them to exercise greater responsibility and 90% said their new skills improved their overall position on the job. Although one in four said the job had become more routine since the introduction of the new equipment, 94% believed the skills opened up new opportunities for advancement.

Another recent survey, handled jointly by Minolta Corp. and the Professional Secretaries International Research and Educational Foundation, produced similar findings. According to that report, 87% of secretaries surveyed felt OA had a positive effect on their profession, and 72% said OA will provide more time for secretaries to spend at more challenging and responsible activities.

Susan Schron has been with the Continental Bank of Chicago for nine years. An administrative secretary in the personnel department, Schron was on hand for the implementation of technology. Though not consulted about the coming machinery, Schron had heard about other sections of the bank that were automated. When the DP people brought in the word processing system, they also trained a few people "on the basics." Optional sessions were offered for further training and Schron took advantage of those.

"The system really helped," she stated. "It has speeded up communications, which is sometimes difficult in a bank. It has also eliminated a lot of paperwork that had bogged us down."

Diane L. Bartley, a secretary at the Bank of New England, added, "I couldn't work in today's market without office automation. It has enhanced my professional skills as well as broadened my job market possibilities."

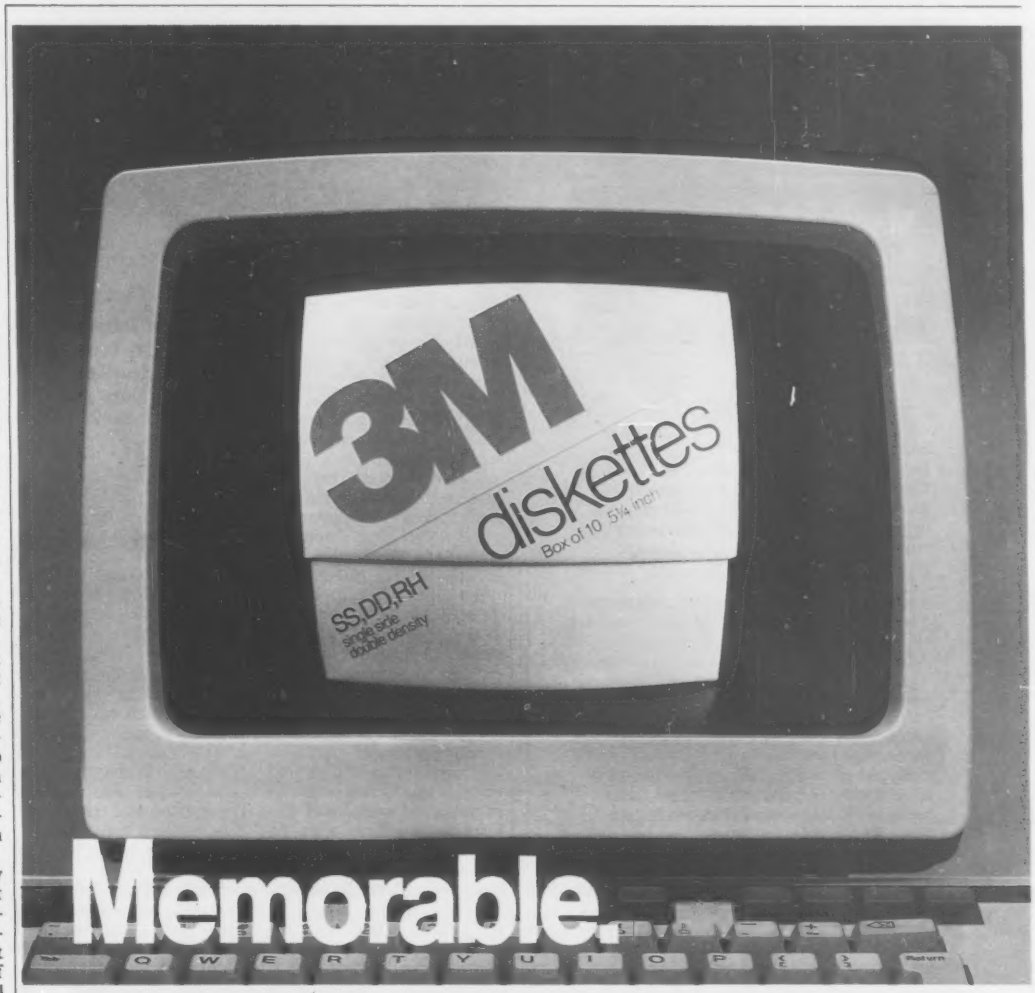
The surveys and individual accolades, however, do not erase the serious problems that have been encountered. Several states have introduced bills on CRT safety to their legislatures, and workers' compensation awards for CRT-related illnesses have already been handed out.

Office workers have become more vocal about the drawbacks automation has brought to their jobs.

A billing clerk at a Boston hospital admitted that information is more accessible with the technology, but said she was unhappy to learn her work is being monitored by the machine she uses. Not informed that such monitoring was taking place, she learned from a monthly report that her output was under scrutiny. "This has pulled me further away from management. It doesn't take into account the other 10 million things I do around here," she said.

At a Boston-area travel agency, a reservation supervisor who sits at her terminal all day has noticed eyestrain and backaches as well as occasional headaches. She said her job would be impossible without the computer, but more job variance is needed to disrupt the monotony. She pointed out that management gave little or no thought to implementation of the technology when it was brought in. Now, because of the vocal response of employees, management is giving more consideration to the structure of the office.

Industrial psychologist Steven Sauter of the University of Wisconsin's department of preventive medicine found, in his Niosh-sponsored research, that CRT users reported less individual control over their jobs than did nonusers. They reported less ability to make independent decisions and felt less capable of taking action.



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In addition, CRT users reported less control over the tempo of their work — the machine had taken control of the pacing. CRT users were also more bothered by environmental factors, such as design of the work place.

Dr. Roslyn Feldberg, a visiting scholar at Radcliffe College, has looked into the issue of job loss. Though serious job loss due to automation is more likely in the future, she said, she has already seen evidence of the disappearance of many traditional clerical positions. "It's hard to monitor it. It happens in a piecemeal manner and tends not to get noticed. The Prudential Insurance field office in Boston was closed, for example, when the DP department made it possible to recentralize the organization." Feldberg remarked that new kinds of jobs will appear with the technology, but that the key question is whether the displaced workers will get the new jobs.

Of course, OA affects more than the support staff. Professionals and managers have faced some of the same questions about automation as secretaries and clericals. Though their rung on the corporate ladder makes them less likely to face the ergonomic dilemmas, their role in the organization is certainly changing with the advent of technology.

Marvin Gross, manager of electronic installations for Metropolitan Life Insurance Co., is optimistic. The role of middle management, he explained, will increase and spread out. Rather than being a collector of data, the mid-level manager will do more analysis of data as the group under his control expands.

There is fear, however, that middle management may be hit by job loss as well. Nussbaum has heard what she called "rhetoric" about "eliminating the middle of the employment profile. One management consultant says the idea is to move $30,000-a-year work onto $10,000-a-year desks."

Nussbaum's organization is keeping a close eye on that trend because they fear it would create an even more polarized work force. "There would be a relatively small group of professional managers at the top and a larger group of deskilled workers at the bottom and no way to bridge that gap," she noted.

If these lamentable scenarios prove accurate, it will be due to lack of direction from upper management and the DP department. The experts tend to agree that a thoughtful and well-directed implementation of OA equipment will bring the desired results. Organizations that report the most positive results are the ones that involve the end users in the implementation process as much as possible.

Deborah Owens, a management engineer for the Children's Hospital Medical Center of Akron, Ohio, reported that the "task team" brought together to direct the automation of their offices included the hospital's management engineer, the director of DP, the director of purchasing, and an experienced word processor user. The word processor user, it turned out, "was the most important member of the team. Only a true operator could evaluate the software in terms of sophistication of features and capabilities and the user-friendliness of the system."

The people being affected need to be brought into the decision-making process, added Rosenberg. They often resist simply because they don't know what is going on.

Training and support after the system is installed is also crucial. Sharon Danaan, a senior rater for a Boston insurance company, explained that a system was installed in her office with no consultation. A supervisor and one other employee were sent to the company's home office for training. The pair was supposed to return and teach the other members of the office. The system, filled with bugs, has never run properly and "the frustration and irritation it has caused has far outweighed any potential value."

'New jobs will appear, but will the displaced workers get them?'

Radcliffe's Feldberg said companies are usually reluctant to allow more than one or two people to be out of the office for training at any one time. Having one member teach all the others usually doesn't work; that person is not a teacher and inevitably cannot answer all questions. Exacerbating the situation is management, which expects immediate productivity on the new equipment. The result is increased stress and displeasure with the technology. Organizations with the most success are those that establish in-house training centers for employees and those that bring the vendor in for consultation and training.

The vendor may, in fact, be the white knight on the OA battleground. Nussbaum stated emphatically that vendors can have a tremendous impact on behalf of the office worker. "We would like very much to increase our dialogue with the vendors. We can give them a view from the real user — not the client, but the woman who types on the machine eight to 10 hours a day."

The larger vendors are starting to listen. IBM reportedly has a 75-person ergonomics staff to address human interface questions. Hewlett-Packard Co. is launching an awareness campaign next year for its marketing people so they can provide one-on-one information to customers. At Data General Corp., all OA products go through stringent design and comfort tests, according to Frank Pinto, director of marketing support: "Not only do we offer training, but it is a requirement for a customer to take DG-supplied training."

Under Dr. Charles Abernethy, manager of human factors, Digital Equipment Corp. has taken a hard look at European standards, which are far more stringent than those of this country. DEC has addressed both the physical and mental problems the equipment has caused. The company is creating its terminals with anti-glare screens, tilt and swivel arms and specially designed keyboards, he said. In fact, DEC is designing its own office furniture. Abernethy's group works hand in hand with DEC's product designers to ensure "fluid interaction" for the user. He said the vendor does have a responsibility for advising how best to use the equipment.

As OA spreads, the synergy between vendor, customer and end user will determine the ultimate acceptance and efficiency of the installed system. Efforts to organize office workers continue as labor unions look to the European model as an example of what unity can bring to the work place. Office workers agree the technology would be more than welcome as long as their concerns are addressed and corrected.

"We do want to use the machines," Nussbaum stated. "The machines are good and can be a benefit, but only under the proper management." OA

Rifkin in a staff writer for Computerworld OA.

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Corporate Moves With Micros

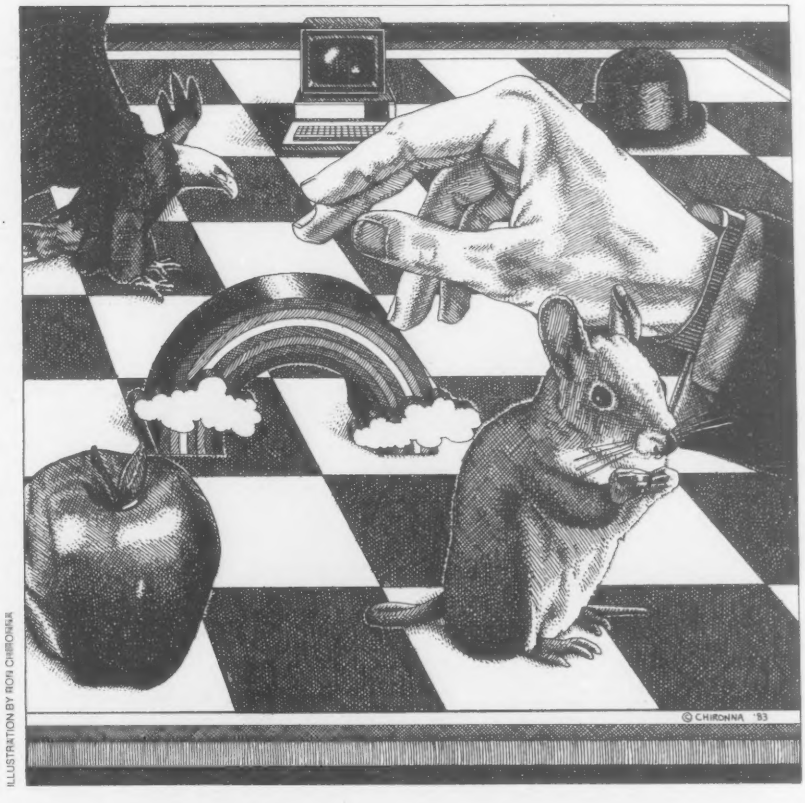

ILLUSTRATION BY RON CHIRONNA

Most major corporations are finding they can no longer avoid developing a corporate strategy for microcomputers. The pressure to set policy comes from two main sources within these large organizations: users who purchase micros on their own and forward-thinking management and DP executives who realize the growth of micro use should not go unattended.

In developing a strategy for effective utilization of microcomputers, corporate management faces many problems, including:

- Training relatively unsophisticated and nontechnical users to operate microcomputers effectively.
- Coordinating the processing of information at hundreds of different locations rather than at a few carefully controlled and administered processing sites.
- Ensuring the integrity and security of data created by microcomputers — data that is less secure and more available to personnel who may want to utilize it in a manner detrimental to the corporation. How can

By Frank D. Girard

organizations successfully address the issue of micro use? One way is to develop a plan that integrates microcomputing within the framework of the firm's overall business and information processing goals.

After an organization reviews its current information processing and business environment, a three-phase approach to developing this plan can be helpful: introduce microcomputer concepts to user departments; develop user operating guidelines; develop overall policies and procedures for effective management, from a corporate perspective, of the development and use of micros. The following checklist points out some key areas in the development of operating guidelines for microcomputer users within a large organization:

☐ ***What will be the primary objectives of microcomputer use in the organization?***

These objectives might include providing improved support for executive decision making, increasing the volume of clerical work performed with existing staff or improving the organization's competitive position in the marketplace.

☐ ***In which areas of the organization will microcomputers be utilized?***

Factors that might influence this decision are the potential impact on bottom-line profits; the urgency of the need to provide microcomputer support; the implementation cost for utilizing micros within specific areas; and the visibility to top management if areas selected for implementation are pilot test sites for microcomputing.

☐ ***How will users be trained?***

Will they be self-trained by means of vendor-supplied documentation? Will they be trained internally by the organization's training department? Or will training be supplied by the new breed of firm that specializes in microcomputer training? What will the training cost, and how will its effectiveness be assessed?

☐ ***What corporate resources will be supplied to the microcomputer users?***

What resources will be supplied for maintaining systems, evaluating new microcomputer software, diagnosing problems and assisting in the many other areas where microcomputer users will require assistance? Will micro resources be supplied by the DP department, the administrative department or another area of the organization?

☐ ***How will communications be handled?***

How can internal and external developments within the micro area be effectively communicated to users? How can duplication of individual user efforts in developing software or programs be prevented?

Several corporations have addressed this issue by establishing corporate computer user groups, microcomputer newsletters, technical libraries and even their own stores where users can shop for and evaluate hardware and software that have been approved for corporate purchase.

☐ ***How will software and hardware evaluation and selection be handled?***

Will users be permitted to purchase their own micro hardware and software from a local computer store? If so, the result may be a lot of incompatible equipment, which would prevent computers from communicating with each other and from efficiently accessing data maintained on other mainframe computer systems. This purchasing pattern also could result in higher acquisition costs by not taking advantage of the combined purchasing power of the corporation.

Factors that could be used to evaluate hardware and software are capacity requirements; extent of vendor support; availability and quality of help functional incorporated in software; completeness and quality of system documentation and system and software training materials; software operating mode, such as menu-driven vs. command-driven software; the extent to which the software utilizes special hardware function keys; and the transferability of data to other software packages.

☐ ***Who will be responsible for data, program and system backup?***

What approach will be utilized to provide adequate back-up facilities for micro programs, data and individual systems so that key processing functions can be performed when system problems occur?

☐ ***Who will respond to user and technical problems?***

When users experience problems with microcomputer hardware and software, how will these problems be addressed?

Several corporations have an internal consulting group to assist in addressing these problems. In addition, many corporations have established a help desk manned by a knowledgeable individual who responds to requests for as-

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Appears in Computer World Office Automation Special Issue, September, 1982

sistance. Such an approach often includes maintaining a log of user and technical problems so that the use of micros and related problems can be reviewed and monitored periodically.

☐ ***Will employees be permitted to take advantage of contracts and computer discounts negotiated by the corporation in purchasing micros for their own use?***

For larger organizations, these discounts can amount to 20% or more. Permitting employees to use corporate discounts for microcomputer purchases can help them to become more knowledgeable about their computers.

The above areas are only a few examples of issues that must be addressed in developing effective operating guidelines for microcomputer users. In addition to these user guidelines, important policy and procedural issues must be addressed if a corporate framework for managing the use of micros is to be established.

These management guidelines include the following:

☐ ***How will data communications be handled?***

Will the corporation's micros be equipped with modems, which permit these systems to access, update and communicate with each other? If microcomputer data communications is permitted, will the organization allow micros to access and update mainframe data? How can the security and integrity of this type of processing be ensured? Will micros be permitted to access on-line information services such as Dow Jones and Dialog? How will the on-line access and communications costs related to these services be controlled?

☐ ***How can the use of micros be audited to ensure that data created on these systems is authorized, accurate and complete?***

The use of micros presents a unique set of auditing problems which cannot always be addressed by conventional computer auditing techniques.

☐ ***Will microcomputer users be permitted to develop their own custom computer programs?***

If these programs are not properly documented and developed and if the programmer leaves the organization at a future date, the effort that went into developing the program may be of no value. Other users will have no method to maintain the program effectively.

☐ ***How will microcomputers be integrated into the organization's corporate information system?***

The corporate information system may include mainframe computers, minicomputers, word processors and corporate communications networks.

How will it be determined when a microcomputer is more suitable than a mainframe computer for a business application?

☐ ***How will microcomputer hardware be maintained?***

Industry estimates indicate that outside maintenance contracts for micros can cost from 20% to 30% of the initial purchase price of the equipment.

☐ ***What will be the policy on portables?***

Will the corporation purchase portable computers for executives to use while traveling? What criteria will be used to authorize a user's purchase of such equipment? How will all micros owned by the corporation be physically controlled to discourage theft of these devices from the organization?

☐ ***Will micros be used as competitive weapons?***

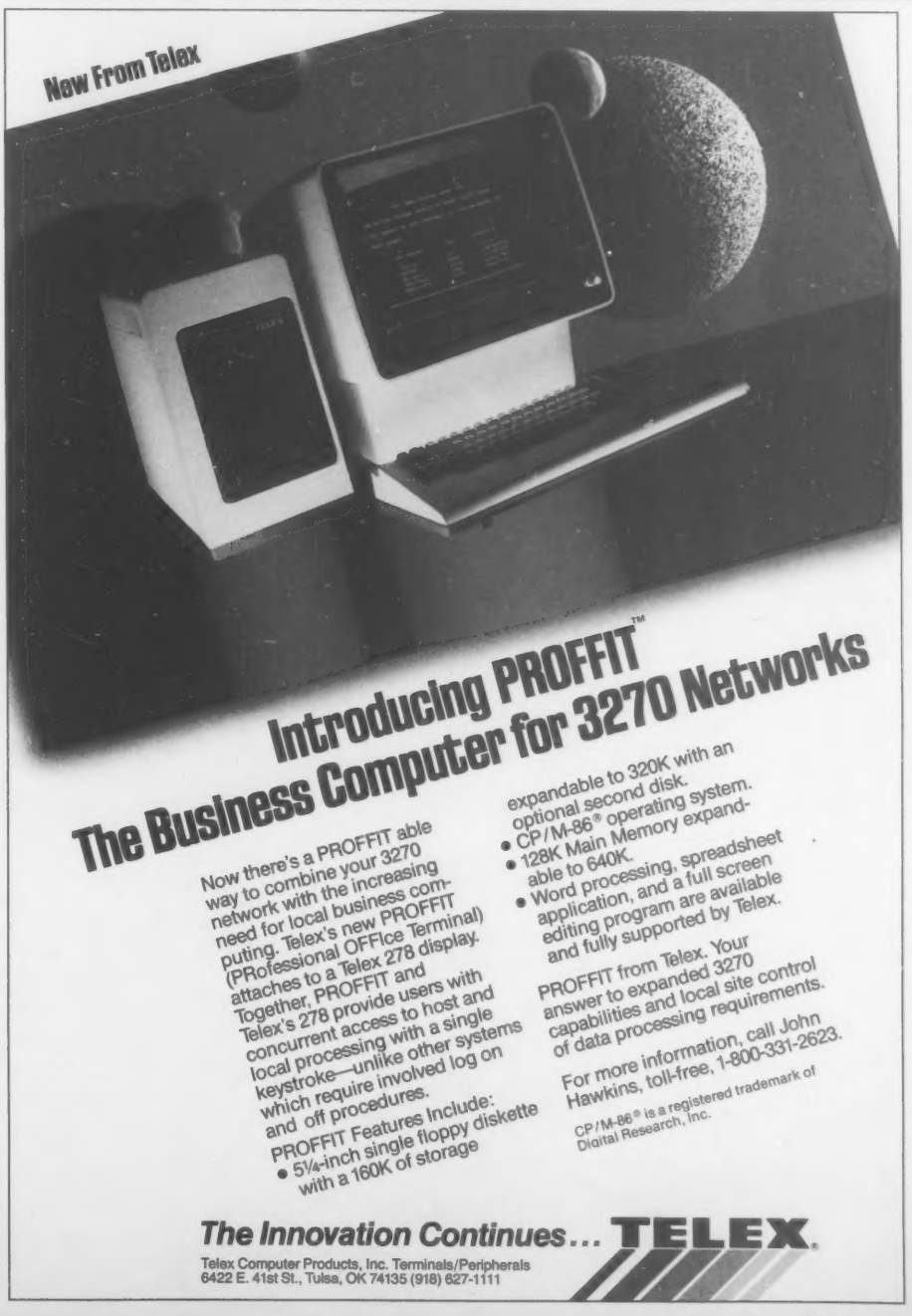
Will the corporation utilize micros outside of the organization as a marketing tool — for example, by providing them to corporate customers as an added-value service?

Several major banks offer microcomputers to personal banking customers to provide banking at home. Other banks are offering micros to corporate customers to assist them in more effectively managing their cash flow by permitting access to commercial customers' cash management accounts.

In summary, the era of microcomputing has arrived at the doorstep of major corporations. Will the problems that result over the next 10 years cause major corporations to look back with regret, or will the opportunities provided by microcomputers revolutionize American business in a positive way?

The answer won't be found in the capabilities of microcomputer hardware and software. Rather, it lies in the approach that corporations take today, in developing a well-conceived plan to promote the effective use of this new technology. OA

Girard is an OA consultant in the Data Systems Technical Consulting Services Group of the New York offices of Ernst and Whinney, an international certified public accounting firm.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Integrated Software: More Than Meets the Eye

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BY KATHRYN COGSWELL CARR

The meaning of "integrated software" can vary from one software vendor to another. For users, however, the term clearly combines two elements: ease of use and software availability. Because ease of use and software availability are key issues in the selection of desktop computer hardware, it is appropriate to examine how they are influencing desktop development and just what is meant by integrated software.

The various integration levels of current microcomputer software offerings can best be understood through an examination of the following key issues: open vs. closed systems, user interfaces, file compatibility levels, multitasking vs. single-tasking and hardware/software requirements. Some current offerings will be examined with an eye to how they address these issues.

Open vs. closed systems: Will the number or type of applications that can be performed be restricted by the software and how the software is employed? If not, the system is an open system. If applications are restricted, it is a closed system. Context Management Systems, Inc.'s MBA is a closed system.

The open vs. closed issue also addresses the relationship between hardware and software. Is there anything in the way the hardware and software interact that affects where and how the integrated software can be used? Apple Computer, Inc.'s Lisa exemplifies this type of system.

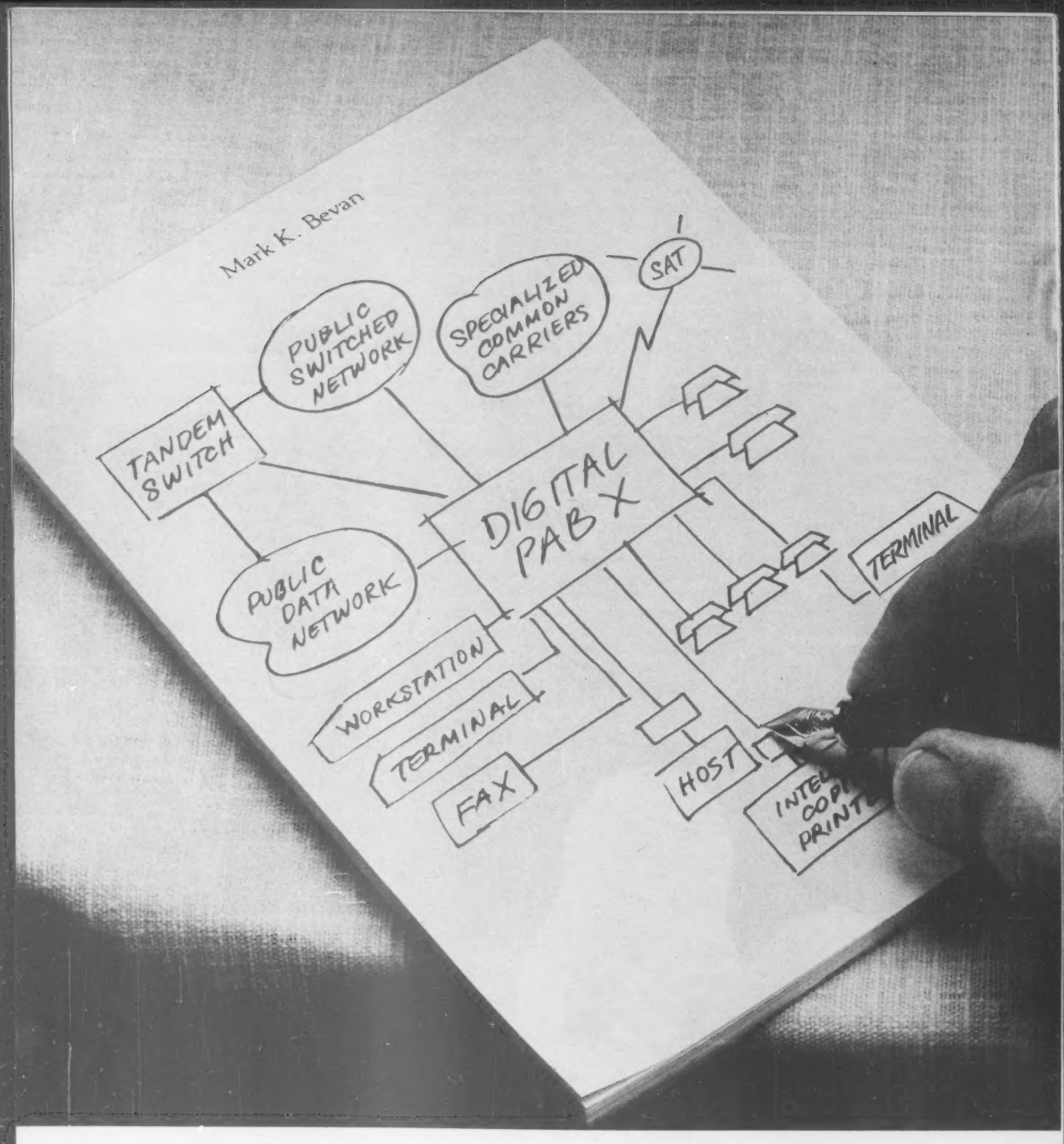
User interface: The most important part of an ease-of-use criterion may be a common command structure that presents a consistent user interface. Ease of use provided by the integrated software should also respect the user's growing proficiency or infrequent usage. This may imply some sort of intelligence in the software — at least the ability to suppress or resurrect levels of help. The degree of integration is also reflected in the levels of help offered, such as the use of graphics-based guidance (or icons), menus, mice, mnemonics or online textual help.

File compatibility: File compatibility is frequently an important reason behind the development of a desktop computer acquisition policy. Simply put, file compatibility is the ability to move easily manipulatable information between applications programs. In the most advanced form, this ability should take place regardless of location (on coresident programs, between peers or to a higher processing level — the mini or mainframe). In highly integrated software, changes made in one application would be reflected automatically in all relevant others.

Multitasking vs. single-tasking: Does the software provide the ability to perform more than one application at the same time? Multitasking capability (also known as concurrency) is provided by some of the integrated software vendors. It allows the user to work on multiple tasks concurrently, switching among them in a way that reflects ordinary work patterns. Single-tasking capability is the operating procedure of stand-alone applications packages; it is also the operational mode of some integrated packages, although they have reduced the time required to switch between applications by putting them all on a single disk.

Concurrent processing, particularly in conjunction with windowing, facilitates quick referencing and information transfer between applications, to the end of mimicking the way a person works on a given project.

Multitasking should not be confused with multiprocessing, a future desktop computer capability. Multitasking is a subset of multiprocessing. Multitasking is a feature of some integrated software



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packages (and the concurrent CP/M operating system); multiprocessing is generally not employed at the microcomputer level because of the limitations of most current microprocessors.

In a multitasking environment, the processing power of the unit is shared among multiple applications on a one-at-a-time basis. The user works on one application with the processing power of the desktop computer directed to that application. The user may stop work, suspending the actual processing of the application while he switches to another application. Because of the speed involved, the suspension of processing is often totally transparent to the user.

In a multiprocessing scenario, the processing power is split among applications. All applications appear to the user to be processed simultaneously. The processor is in fact still processing them one by one, but alternating instructions from each just enough to process them as jobs.

An analogy of multiprocessing could be based on the circus performer who sets a series of spinning plates in motion. The performer must move from plate to plate, setting each in motion, then returning to each to give it enough of a push to keep it spinning till he is able to return with the second, third and fourth pushes and so on.

Visualizing how application windows would work in both types of environments helps to illustrate the differences between multitasking and multiprocessing. In a multitasking environment, one application (or more) appears in freeze-frame, while another single application is live in another window. With multiprocessing, all of the windows, representing more than one application, are live.

Decreasing memory prices — which encourage the utilization of fixed-disk options — and increasing processor speeds will continue to spur the incorporation of the multitasking capability into desktop computer hardware and software. In addition, the increasing use and availability of 256K-byte microprocessors will encourage the incorporation of multiprocessing capabilities at the desktop computer level.

Hardware/software requirements: The hardware and software required to make the integrated software operational varies by package. Those at the higher levels of integration have more specific hardware requirements in terms of processor speed, mass memory and so on. How providers of integrated software address each of these issues illustrates the diversity in the definition of the term "integrated."

Although categorizing can be hazardous, particularly in as fast-paced a market as desktop computer software, the Yankee Group has established four categories of integrated software:

Decreasing memory prices — which encourage the utilization of fixed-disk options — and increasing processor speeds will continue to spur the incorporation of multitasking into desktop hardware and software.

- Hardware/software integrateds.
- Software integrators.
- Integrated software.
- Associated software.

The hardware/software integrateds are epitomized by Apple's Lisa; their systems (both hardware and software) have an extremely tight, synergistic relationship. In Lisa's case, the operating system is proprietary, and applications that can be performed are limited to those initially provided by the vendor or developed by a third party under license.

In either case, the required adherence to a proprietary operating system means the hardware/software integrateds are essentially closed systems.

Data General Corp. and Honeywell, Inc., with their Desktop Generation Series and Microsystems 6/10 and 6/20 respectively, have sidestepped this problem by split-

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ting their operating environment. Each of these units supports an operating system proprietary to the company and compatible with its minicomputer line. Their software and hardware therefore are highly integrated, which ensures file compatibility at both the desktop level and above, as well as a common user interface throughout the product line.

What opens these systems is that each also supports industry-standard operating systems — CP/M and MS-DOS — that allow the desktop computers to take advantage of vast quantities of available applications software written by third parties.

The advantage to the user of a hardware/software integrated unit is the guaranteed common command structure and total file compatibility of applications. In addition, the safety of single vendor sourcing means that, if something is wrong, only one vendor is to blame. With hardware/software integrated units from minicomputer vendors, the benefits of a coherent family of processing units is also achieved.

The desktop computer with only a proprietary operating system might not become a standard with high-volume sales. In that case, vendor software development may lag, and third parties may lose the interest and incentive necessary to develop applications.

Some entry-level desktop computer users not partial to a certain minicomputer family may be confused by the seeming myriad of hardware and software choices. They may adopt the hardware/software integrateds, such as Lisa, as the safest route to desktop computing. However, the desktop computer with only a proprietary operating system might not become a standard with high-volume sales. In that case, vendor software development may lag, and third parties may lose the interest and incentive necessary to develop applications.

The user must be willing to accept the limitations imposed by a restricted set of embedded applications software and be content to wait until the vendor or licensees are ready to provide additional applications he may want.

The hardware/software integrateds provide a multitasking capability; in the case of Lisa, two or more applications can be run concurrently. More than one application can be worked on, each viewed on a single screen in a series of windows. Graphics-based guidance and selection by pointing by means of a mouse are user-interface devices designed to make desktop computer usage easier. These user interfaces were first used in Xerox Corp.'s Star to address the ease-of-use issue. The importance of that issue is evident in the adoption of these devices by the hardware/software integrateds. However, the incorporation of these interfaces into the less pricey desktop computers is and will continue to be a result of the greater availability of memory and faster processing.

The use of graphics-based guidance is more advanced in Lisa than in the DG and Honeywell examples. Their strength lies in their file compatibility with other members of their product families, something Lisa fails to provide.

The software integrators provide an environment that is at least hardware-independent, unlike the software integrateds, which are tied to hardware and a proprietary operating system. Software integrators function with industry-standard, not proprietary, operating systems — for example, CP/M, MS-DOS and, soon, Xenix for the 8-, 16- and 32-bit processors.

In theory, software integrators can accept an unlimited number of applications packages — possibly from diverse sources — and run them concurrently. Therefore, these software integrators provide an open system in contrast to the software integrateds' closed system.

Windowing capability is a feature the software integrators share with the integrateds. Files are transferable between applications that can be performed concurrently. To varying degrees, the

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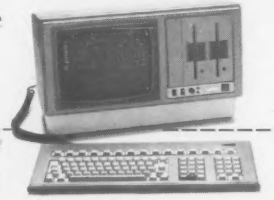

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software integrators also provide a common command structure or consistent user interface and are supported by specific hardware requirements. The principal examples of software integrators are Visicorp.'s Vision and Quarterdeck Software's Desq, each of which requires 256K bytes and a rigid disk. These two examples illustrate that, even within the neat yet general category of software integrators, distinctions exist. The distinctions reflect the raison d'etre of each of the providing companies.

Visicorp., of San Jose, Calif., touts Vision as an applications environment, not an operating system. Vision is alleged to be independent of both machine and operating system, sitting on top of the operating system and providing a nesting place for a variety of applications packages to be run concurrently. Initially, it will be offered for the IBM Personal Computer, Wang Laboratories, Inc.'s and Texas Instruments, Inc.'s Professional Computers and one of Digital Equipment Corp.'s desktop computers.

Is Vision open or closed? Theoretically, it is open — applications that can be run under Vision are not limited by the hardware/software configuration, except for memory requirements of each application. However, in order for third-party software vendors to link with Vision, certain Visicorp. specifications must be met. No data transfer is possible between applications without it.

Vision's windowing capability allows the multiple applications being performed to be visible on one screen concurrently. Its "consistent user interface" uses a mouse and nine English commands. A bar of commands sits at the bottom of the screen, plus commands unique to each application in every window. Initial applications supported are spreadsheet, WP, data management and graphics, all from the Visi-stable of applications packages. Visicorp. is, after all, in the applications software business. Therefore, the applications of the host house will come up first and will be more synergistically integrated.

Vision was introduced in November 1982, with promises of availability by summer of 1983. Currently, Vision is not expected to ship until at least late fall of this year. In designing Vision as it has, Visicorp. has attempted to trade on its rather impressive reputation and to consolidate its hold on a huge installed base of Visi applications users. By providing a means of linking all Visi applications together, Vision extends the life of individual single-application packages in an increasingly integrated desktop computer world. The licensing of third-party software vendors (plus provision of development tools and so on) can help to extend the life of existing Visi products by expanding the applications line.

Desq, from Quarterdeck Software, Inc. in Santa Monica, Calif., is a software integrator that uses its lack of a software installed base to its advantage. Instead of trying to protect its past revenue base, Quarterdeck is seeking to be a universal link.

Quarterdeck claims Desq will offer users the ability to integrate their favorite MS-DOS-based off-the-shelf applications packages — regardless of their source — into a common-command, multitasking vehicle. This ambitious plan makes Desq the ultimately open system. Like Vision, Desq allows users proficient in certain applications packages (or from companies that have standardized on certain software formats) to bring that expertise with them into the integrated environment. This means familiar command formats resident in those packages can be used or, with Desq, intercepted by the Desq program and front-ended by a common set of Desq commands. Quarterdeck claims to be able to handle any package that runs under MS-DOS, except those whose performance is somehow tied to actual hardware. According to Gary Pope, Quarterdeck's executive vice-president and founder, the firm has successfully tried about 70 packages in-house.

Desq provides another interesting feature, which results from its "artificial intelligence-like" language, said to be similar to Smalltalk and Lisp. It allows the system to learn functions as performed by the user, to be stored and reused — a sort of program-as-you-go feature. It allows the system to truly mimic the way a user works. This kind of almost porous software that accepts its program content from the user will be an increasingly important feature of desktop computer software.

Windows and mice are also a feature of the Desq system, but the keyboard can be used equally well.

In terms of hardware requirements, Desq is not much different from Vision. It, too, requires 256K bytes and, minimally, a 5M-byte disk. Quarterdeck introduced Desq at Comdex — Spring in Atlanta in April and promised its release for September of this year. Company sources now schedule the release for October — just like Vision.

Of the two announced software integrators, Desq's approach may be the best immediate solution to the complexity of today's desktop computer software market. Its proclaimed ability to support a myriad of products reflects the diversity of currently available software packages and the trouble users now face in integrating them. However, both Desq and Vision still have to prove their merit in actual operation. Questions exist as to how Desq's close to universal approach can retain the nuances of individual packages it supports.

In the hardware/software integrateds, software and hardware are bundled. In the software integrators, the software serves as the integrating repository for a variety of single application packages.

Integrated Software: Two currently available integrated software packages meet the criteria assigned to our category of the same name. Their physical integration, common command structures and internally compatible files place these two packages in the category of integrated software.

MBA from Context Management Systems, Inc. (Torrance, Calif.) and 1-2-3 from Lotus Development Corp. (Cambridge, Mass.) offer a given set of applications resident on a single disk. This differs from examples of the two previous groups: In the hardware/software integrateds, software and hardware are bundled; in the software integrators, the software offering serves as the integrating repository for a variety of single application packages.

By basing its offerings on a single disk, each of these integrated software packages addresses a major ease-of-use issue. The user is not required to swap diskettes with each application change — a

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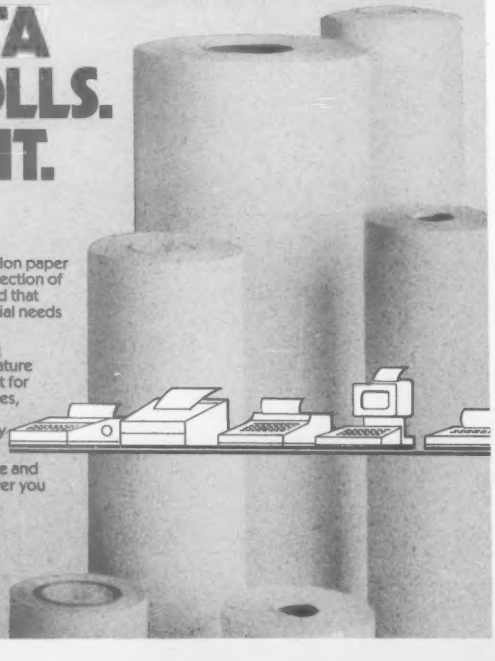

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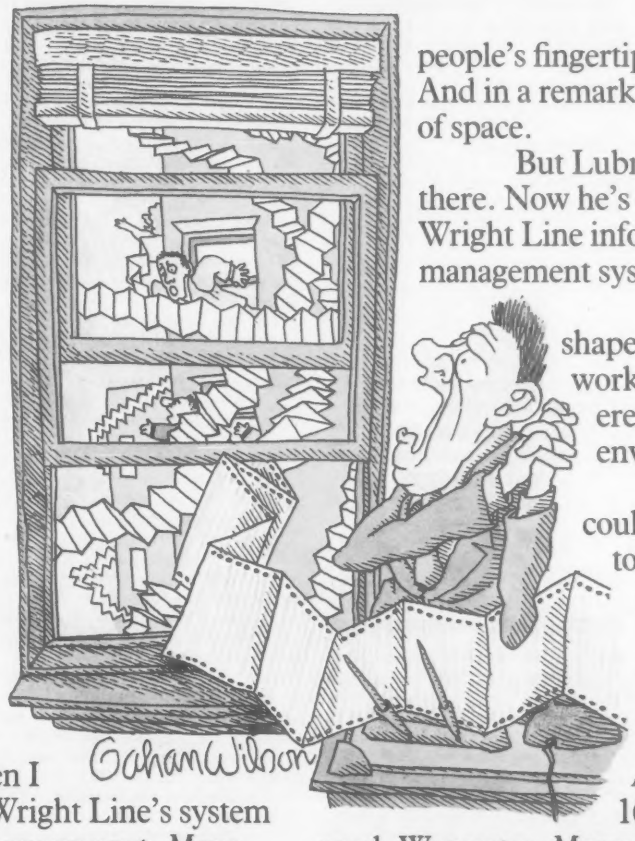

He laughed when I suggested he consider Wright Line's system of information media management. More specifically, Wright Line's latest thinking on work-in-process filing.

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time-consuming and possibly error-prone process, but a necessary one with nonintegrated software. These integrated software packages also offer the advantage that all files are internally compatible and a common command and help structure is provided.

However, the software that is available to the user is limited in this type of system to a given set. Therefore, although one of the criteria for desktop computer product purchase — ease of use — is met, the other — software availability — is not addressed.

Priced at $695, MBA offers spreadsheet, graphics, data management and some WP (8,000 characters). At $495, 1-2-3's principal application is spreadsheet, which is enhanced with graphics and limited data management capabilities. The 1-2-3 WP is basically nonexistent and will be added later this year. Given the fact that WP closely follows spreadsheet as the second most frequently performed application, this capability is a necessity. Because the applications set is limited in both cases, these integrated software vendors provide closed systems.

Both integrated software packages are seeking to make their offerings, if not open, at least less closed. Lotus in particular is working to connect 1-2-3 to the outside world — to the service bureau offerings of ADP Network Services via ADP's Datapath and to corporate mainframes through its relationship with McCormack & Dodge Corp.'s Interactive PC. In both cases, data resident elsewhere can be downloaded into 1-2-3 at the desktop level, manipulated and uploaded, without reformatting.

Although both MBA and 1-2-3 are single-disk-based, closed applications systems using internally consistent user interfaces, some significant differences do exist. Under MBA, applications are performed concurrently and can be viewed simultaneously in a series of windows. Lotus' 1-2-3 performs its applications serially and does not use windows, although it is very easy to switch between spreadsheet and graph.

The multitasking vs. single-tasking approaches manifest themselves in different hardware requirements. MBA requires 256K bytes; 1-2-3 requires only 128K (Release 1A, which is compatible with the IBM PC-XT and several other computers and peripherals requires 192K). Both require two double-sided disk drives.

Both of these packages are mouse-free and rely on keyboard commands, mnemonics and highlighting for commands. Both come with tutorial/demonstration disks.

Associated Software: Associated software is the final form of the so-called integrated software discussed here. The term "associated" reflects the loose degree of applications integration provided by package vendors. As with previously categoried offerings, some applications are more closely associated than others.

High-end associated software is defined as a series of individual applications packages (usually from the same vendor) that share a common user interface. In addition, a common file structure allows the transference of data between applications that run either serially or concurrently. Low-end associated software can be defined as a series of applications packages — again, usually from a single vendor — that share file compatibility potential, which can be loosed through a utility program.

Microsoft Corp.'s Multi-Tool expert systems will probably be the most closely related high-end associated software offerings. Two are currently available, Financial Statement and Budget, and are billed as "powerful additions" to Microsoft's best-selling Multiplan electronic worksheet. Both can run on Apple II, II+ and IIe with 64K bytes and one disk drive, or under MS-DOS with 128K bytes.

Each type of integrated software provides utility for the broad spectrum of desktop computer users today.

The associated nature of the software provides a file transfer capability and a common command structure, in an effort to promote follow-on sales to a user base familiar with the applications vendor's general modus operandi. This group consists of users with whom Microsoft has developed a reputation for reliability — a large group, given the prevalence of Apple and MS-DOS-based desktop computers.

Multi-Tool Word is another addition to the Multi-Tool series, with the same hardware requirements. It differs from the previous two in its heavy use of a mouse for selecting and executing commands. An expert level allows the user to abandon the mouse and utilize command keys. This package also provides up to eight windows within its single WP application for viewing a series of documents and moving text among them. Multi-Tool Word can also incorporate printed files from Multiplan and other Multi-Tool application packages.

With its reliance on the mouse, Multi-Tool Word is a step toward an advanced hardware version of other Multi-Tool applications packages. They will most likely be designed to run under a 3.0 version of MS-DOS, providing multitasking capabilities, windowing, mouse cursor control and possibly icon graphics. These features will increase the hardware requirements, no doubt to include 256K bytes and a hard disk.

Each type of integrated software discussed provides utility for the broad spectrum of desktop computer users today. None of them may prove to be long-term solutions for integrated desktop computer applications. Based as it is on a prevalent, industry-standard operating system and providing a compatibility and a common interface for a large number of diverse applications packages, Desq may be the short-term solution to software integration. This could be true particularly in cases of user proficiency or some substantial user investment in diverse software, according to the Yankee Group.

For the long term, two of the abovementioned types, reflecting different market populations, may have greater success. In larger organizations, certain hardware/software integrateds may provide the best solution. These are the hardware/software integrateds that combine a proprietary operating system with an industry-standard operating system, thereby providing file compatibility, common user interface and a large amount of available software at and above the desktop processing level. Examples are Data General, Honeywell and, before too long, IBM.

Hardware/software integrateds without a bridge between their proprietary operating system and the industry standards or an additional processing level to communicate with will find themselves with a dearth of applications software. For this reason, Apple may elect to support MS-DOS with Lisa before the end of 1983.

For smaller organizations where requirements for communications to internal mainframes and minis is not an issue, the software integrateds may provide the best solution. The software integrateds could provide a core applications package — spreadsheet, WP, graphics, data management — with a receptacle for an industry-specific applications package. These packages would be written by third parties, to be loaded in by the user. In addition, links to outside data bases such as those being pursued by 1-2-3 could provide access to additional data. Again, a common command and help structure would be provided and file compatibility ensured.

In both cases, how successfully the issues of user interface, help and file compatibility are addressed will determine the market success of the integrated software. OA

Carr is a consultant at the Yankee Group, a consulting firm based in Boston.

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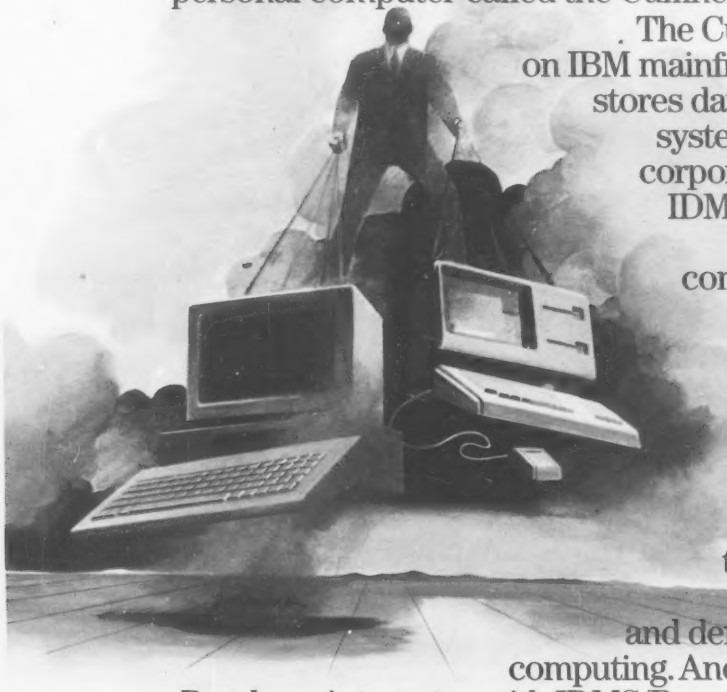

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Harris' Joseph A. Boyd *(right)* and Jack C. Davis hope the company's new Series 9000 Office System will lead them into the forefront of the OA market.

PHOTO © 1983 DAVID KNOX

Harris Heads Into The Office

It is hard to imagine a $1.4 billion company having an identity problem, but for Harris Corp., the Melbourne, Fla.-based information technology giant, its lack of visibility may be the largest stumbling block in a vigorous quest for a share of the office automation market.

Despite having built a strong and respected reputation in the communications, semiconductor and government systems markets, Harris has been a stranger in the office. Several years ago, it became clear to Dr. Joseph A. Boyd, Harris' chairman and chief executive officer, that the company would have to recreate its image and redefine its strategy in order to become an integrated information processing systems vendor. Boyd targeted the automated office as a key to survival in that arena.

Unfortunately for Harris, the company had everything but an office product. The attempt to design and market a word processing system met with dismal failure; at least two major WP development projects, reportedly out of tune with the current market, had to be scrapped before introduction. The current offering, the Series 9000 Office System, has looked good to industry analysts, but, given the fact that it is

BY GLENN RIFKIN

already a year overdue and still in the beta test stage, there is strong feeling that it may be too little too late.

However, Boyd has thrown Harris' resources behind the 9000 (it cost more than $30 million to develop) and believes strongly in the product. To speed up Harris' entry into the office market, Boyd engineered an unexpected merger with Lanier Business Products, Inc., a leading low-end WP vendor. Barring unforeseen obstacles, that merger should be formalized later this month.

Though the Lanier merger has drawn a great deal of attention in the industry, it has not produced any rave reviews. Some industry analysts believe the deal has potential because it combines Harris' technical expertise and good reputation at the high end with Lanier's vast sales and distribution channels at the user level. Others are openly skeptical: "People who think this is a perfect marriage are naive," said Tom Billadeau, president of the Office Systems Consulting Group. "First of all, Harris doesn't have a product out there yet; second, Lanier's sales force has won no prizes going to the large Fortune 1000 companies. They won't be much help with the large organizations."

Concern is also being expressed about how the merger will be managed. Initially, Harris plans no changes and will let Lanier operate as an independent sector under its current management. Boyd expects to utilize Lanier's 700-member sales force to introduce the Series 9000 in January or February.

"Properly nurtured, the deal can do them well," said John Murphy, vice-president of Advanced Office Concepts. "But can it be nurtured properly? I look at the Burroughs-Redactron merger. Redactron was a major factor in the word processing market and after the merger they disappeared. They were buried. The key to the success of this deal is the integration of peopleware."

Whether or not the merger meets Harris' expectations, a larger question remains: Can Harris, at this stage of the game, become a major player in the OA marketplace? Company officials are guardedly optimistic. Jack C. Davis, senior vice-president of the information systems sector, admitted that Harris is a company in transition, but said the Lanier merger is an example of the transition, not the cause of it.

"We wouldn't be doing it if we didn't think we could," remarked Davis about Harris' foray into the office market. "We have been transitioning this company over a long period of time rather successfully. We moved from a printing company to an electronics company, and people said that couldn't be done either. I say our record is pretty good."

In fact, Harris' divestiture of its highly successful printing business earlier this year raised a few eyebrows. That business had been responsible for nearly 25% of Harris' revenues in 1982; selling it cut off the last remaining ties to the company's roots. Having begun in 1895 as a printing business, Harris decided the future looked brightest in the information processing field and set its course accordingly.

Although the Lanier merger has drawn a great deal of attention in the industry, it has not produced any rave reviews.

"Selling the printing business was the correct move. Either you're strictly in the technology business or you're a conglomerate. Sperry and Honeywell have shown the problems trying to do that," said Stephen McClellan, vice-president of Salomon Brothers, Inc., a New York financial analyst firm. "It's time Harris concentrated on technology."

In fact, Harris has been concentrating on technology for some time. Harris has had major success stories in many of their other businesses, including data terminals, satellite and telephone communications, semiconductors and superminicomputers. Davis pointed out that most Fortune 500 companies have some Harris equipment (an estimated 60,000 Harris terminals are installed with 6,000 customers). Operating in an autonomous, decentralized mode, each of the company's 25 divisions has been able to carve out significant niches in its respective markets. The mandate now, however, is to pull these resources together to offer a total integrated information processing capability to customers.

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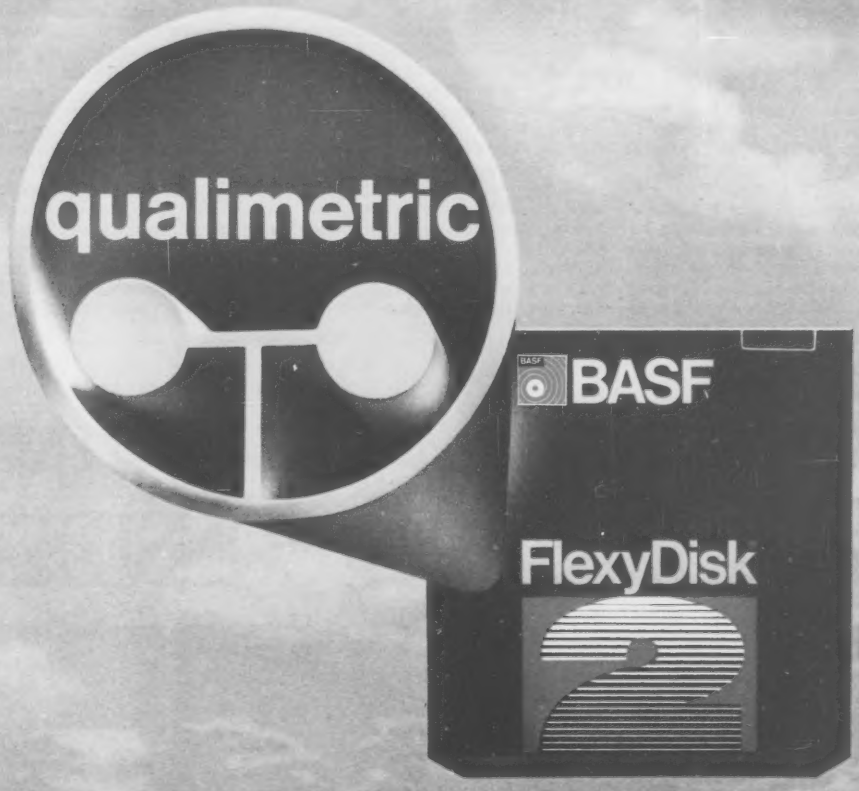

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Davis said that with Harris' strengths in all these areas and the pending introduction of the Series 9000, the company is ready to tackle the heavy OA hitters. "It may be characterized as a gamble, but it's a nonoptional gamble. If you're going to be in this business, you've got to have all these elements and be able to tie them together. We've got to transition to a much broader marketing and sales company than we have been and move away from some of these niche markets."

Therein lies the rub. Many industry analysts believe it will be very difficult for any newcomers to squeeze past the barriers IBM, Digital Equipment Corp. and Wang Laboratories, Inc. machines represent in the office mart. Can Harris unveil both a solid product and an impeccable marketing scheme quickly enough to gain a significant market share? Many information systems managers take the stance that unless a company has a vastly innovative product to offer, it's better to stick to names you know.

"Just because you have the individual pieces, doesn't guarantee that you end up with a masterpiece in the end. Their success is contingent upon how much of a market share they go after," said Billadeau. "Will they give IBM, DEC and Wang a run for their money? The answer to that is no."

Added McClellan, "They're not only late, they're also going into the market with relatively small weapons. It's a big risk because office automation is a capital-intensive market. They figure to play a small role at best."

Boyd said that Harris, through its data terminals business, has established a positive presence with DP and management information systems managers and that, combined with the $400 million Lanier office products base, should provide an acceptable name in the market. Boyd is assuming that Lanier's sales force, already familiar with the office market, can be trained to sell Harris' high-end systems along with the Lanier stand-alone line.

Harris, in fact, is taking a stance of compatibility, not head-to-head competition in the office. The Series 9000 is being constructed to coexist and interact with both IBM and Wang in the office environment; the aim is not to displace IBM or Wang, but to add Harris. Indeed, the new system was designed using many of the best features of Harris' competitors, according to J.R. Hughes, manager of product marketing for the distributed office systems division. The Series 9000 is not just a WP product, said Hughes, but was developed with communications and networking in mind.

Based on multiple 16-bit micros, the Series 9000 utilizes Harris' own Nodal Operating System (NOS), which is a multitasking, distributed processing system with integral network support features. Designed with a layered architecture, the 9000 reportedly will be capable of operating in a stand-alone environment as well as a clustered setting with total hardware/software compatibility. It will also have document exchange capabilities with both IBM and Wang word processors, according to its vendor.

The series is scheduled to include the 9010 Standalone Word Processor, the 9015 Professional Computer, the 9020 Mini Cluster, the 9050/9060 Cluster Systems and the 9070 Network Systems. Prices will range from $9,500 for the stand-alone system up to $84,000 for a typical cluster with eight workstations and four printers, according to Harris.

Most important to the success of the Series 9000, in Harris' view, is that it serves as the basis for communications and networking products. Under the direction of Walt Frederickson, vice-president of technology, the company is developing local-area networks — baseband, broadband and private branch exchange (PBX) — which will provide gateways to wide-area communications links using protocols such as 2780/3780 and 3270/SNA. The local-area network, generically named Hnet, is scheduled for early 1984. The company said it plans to adhere to IBM standards until the international OSI standards are adopted. At that time, it will offer gateways to all the major public and proprietary networks.

"There's no single answer to the network question," said Frederickson. "We'll see multiple networks in the business environment whether we like it or not. Ours is designed to link people together in the way they really work by integrating work groups and also providing bridges to other work groups."

Harris has also expanded its already successful entry into the PBX market by announcing a digital PBX product that can reportedly be used as a data or voice port.

According to Davis, the Series 9000 is unique in its architectural concept and its integration of WP and DP with the networking capabilities. Boyd pointed out that the 9000 concept will serve as the

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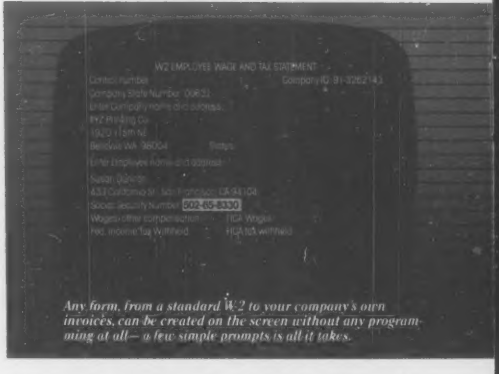

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R:base is also very forgiving. It's very hard to make a mistake. That's because commands are simple English expressions—like SELECT, PROJECT, WITH, WHERE, FROM, etc. Dates and dollar amounts are written normally: 11/16/83;

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R:BASE 4000	100 billion	40	400	0:59	Yes	$495
dBASE II	65,535	2	32	5:47	No	$695
CONDOR	32,768	2	127	2:03	No	$650

*Sort 1000 records on 1 key value. (IBM PC with 256K and DS DD diskettes)

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foundation for Harris' products for the next 10 years.

McClellan of Salomon Bros. observed that the 9000 seems to be competitive with other products in the marketplace, but doesn't "leapfrog" anything either. "The question is, Can they market it? I have to be somewhat skeptical about that."

"I don't think they're going to be very innovative," stated Murphy of Advanced Office Concepts, "but they don't have to be. They need good, solid products and the ability to coexist in the IBM mainframe and PC world. This game is not run by the technology, but by marketing and functionality at the user level."

As Harris is well aware, its clearest path to the office is through organizations where it has an established reputation with its other technologies. It has a solid and growing presence in the government and defense industries and impeccable credentials as a telecommunications manufacturer. A recently announced 48-bit superminicomputer should enhance its position in that market, and its new Cmos 16-bit microprocessor should bolster a sagging semiconductor business. Jim Oyler, vice-president of marketing for the information systems sector, pointed out that these businesses give Harris varied entries into organizations and a chance to show how Harris can tie it all together.

'Office automation, despite all the publicity, is still in its infancy. The acquisition of Lanier buys us time; it might have taken five years to get to the position we now have.'

According to Davis, those strengths have been a mixed blessing. Harris, he said, can't afford to be known as just a computer company or just a semiconductor company. It must be viewed as a broad-based communications and information processing company. "The sophisticated buyer who is installing those superminis and interfacing them with networks understands what we're about. What we have to do is get known better by the knowledge worker."

This scenario will eventually work in Harris' favor, according to Boyd. Office systems and office users are becoming more and more sophisticated and DP people are increasingly called upon for advice. "That's going to help us get in the door. Then it's up to us to prove we can deliver," he said.

Harris doesn't intend to leave anything to chance. There will be a significant increase in spending on product development along with sales and marketing reaching up to 12% of sales revenues, according to Boyd. The company, heretofore conservative in its advertising, will take an aggressive stance in that area. Industry analysts agreed Harris is financially equipped to confront the office challenge. Along with steady revenues from its other successful businesses, Harris added $250 million to its coffers from the sale of the printing business. The Lanier merger was accomplished via a stock swap to avoid biting into that cache of cash.

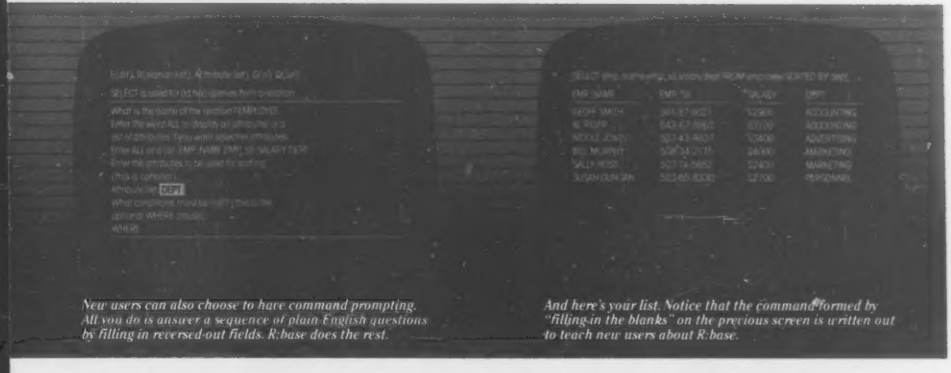
Harris has suffered seven consecutive quarters of declining profits, but McClellan attributed that to the cyclical nature of the technology business. Harris, he added, is "still a healthy, deep and strong company — very sound financially."

Though the skeptics about the Lanier merger and Harris' entry into the OA market are many, the company believes there is time to have an impact. "Office automation, despite all the publicity, is still in its infancy. The acquisition of Lanier buys us time; it might have taken five years to get to the position we now have," said Oyler. "We are buying an irreplaceable mechanism for distribution."

Harris, with its core products, the ability to tie those products together and a strong service and support commitment, is going to be a force, Davis added. It is simply a matter of whether Harris will be "great and dominant or just good." OA

Rifkin is a staff writer for Computerworld OA.

PURCHASING dBASE II,™ THIS FIRST.



New users can also choose to have command prompting. All you do is answer a sequence of plain-English questions by filling in reversed-out fields. R:base does the rest.

And here's your list. Notice that the command formed by "filling-in the blanks" on the previous screen is written out to teach new users about R:base.

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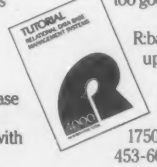

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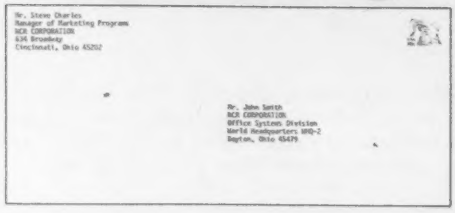
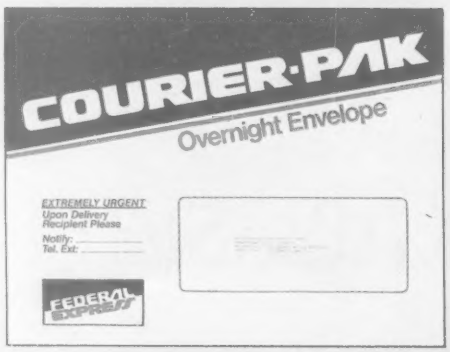


Tomorrow



Of course, WorkSaver Electronic Mail is easy to use. It's also secure. Your personal password, identification number, name, and alias make sure only you have access to your messages.

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OA FOCUS: OUTPUT TECHNOLOGY

Office technology is developing at rapid-fire speed. However, that doesn't mean that the more traditional and time-proven technologies should be abandoned. The successful manager will be one who can integrate existing equipment and systems and adapt them to new products. This "OA Focus" pinpoints some output technologies like micrographics that can work with the newer, more sophisticated tools that you will be encountering soon.

Micrographics 37
Business Graphics 45
OCR and Electronic Mail 49
Optical Disks 53
CAR and Micros 57

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013 10/12/83

MICROGRAPHICS

BY JOHN O. FRISVOLD

Like orange juice (which isn't just for breakfast any more), micrographics can now be found in situations where it was undreamed of in the past.

The information systems manager who will be able to organize a more integrated computer system for his organization is one who knows where current micrographic technology has come from, understands what's ahead for it and can see how it dovetails with systems already here or on the advanced office horizon.

Micrographics remains the technology for low-cost, space-saving information storage. Unlike any other accepted storage medium for copied documentation, it provides accurate, tamperproof recording and storage of evidentiary documentation such as legally sensitive deeds, warranties, contracts and checks. But, does micrographics really belong in the world of office automation?

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Yes, it does. For example:

• A California bank's international operations office with 250 client banks worldwide finds that a stand-alone computer-assisted-retrieval (CAR) system for microfilm records saves space, is easy to operate, is fast and will save $12,200 annually over a 10-year period.

• A paper company's southern operations switched to electronic filing in records management. Productivity increased (overtime in accounts payable alone was cut by several hundred hours) and working conditions improved (because 37 file cabinets were eliminated).

Indeed, the new micrographics systems and their compatibility with other technologies are changing the ways records are stored, retrieved, displayed and reproduced. Today's state-of-the-art reader/printer, for example, can produce dry prints in seven widths and 10 push-button-selected lengths; can utilize 14 automated search modes (with accommodations for future modes, as well); and offers the option of on-line operation with a mainframe or mini system.

The computer can order up to 250 concurrent searches, each specifying cartridge number, frame address, size and number of prints and the name of the requester. If you prefer, you can opt instead for a manual-search version of the same unit, with odometer indexing only. Either way, the reader/printer can use any cartridge from its manufacturer, any Ansi cartridge or any open reel of 16mm microfilm, even those produced on early systems. This top-end reader/printer is not unique in its ability to marry micrographics and computers.

At the recent convention of the Association for Information and Image Management (formerly the National Micrographics Association), presentations from both large and small companies focused on computer-assisted-retrieval (CAR). This hybrid combines the speed and accuracy of computer intelligence with the low-cost, mass storage capacity of micrographics. In a stand-alone CAR system, the micrographic portion of the system is driven by a minicomputer. Receiving its direction from a software program, the computer directs the micrographic unit for indexing and retrieving microfilmed documents in a matter of seconds. Because the system is completely under the control of the operating department and works as a stand-alone for its specific use, no liaison with a mainframe is required.

An on-line CAR system links the system's micrographic capacities directly to a centralized computer. These systems are justified when used in data base applications large enough to warrant total dedication of the central computer.

According to recent statistics, CAR systems seem to be divided fairly equally among manufacturing firms, governmental bodies, service industries and insurance/finance institutions. In the government sector, the federal government takes the largest credit for CAR usage, followed by state and city governments.

Applications such as order entry, accounts payable/receivable files, mortgage and installment loans and invoicing make up nearly 50% of today's CAR installations. Credit card and bank-by-phone application files and military and police records account for another 20% of CAR usage; the remaining 30% is divided among student loan files, personnel files, medical record files and miscellaneous applications.

CAR systems offer the following advantages:

• Marked reductions can be made in the labor-intensive tasks of sorting, filing and retrieving paper documents.

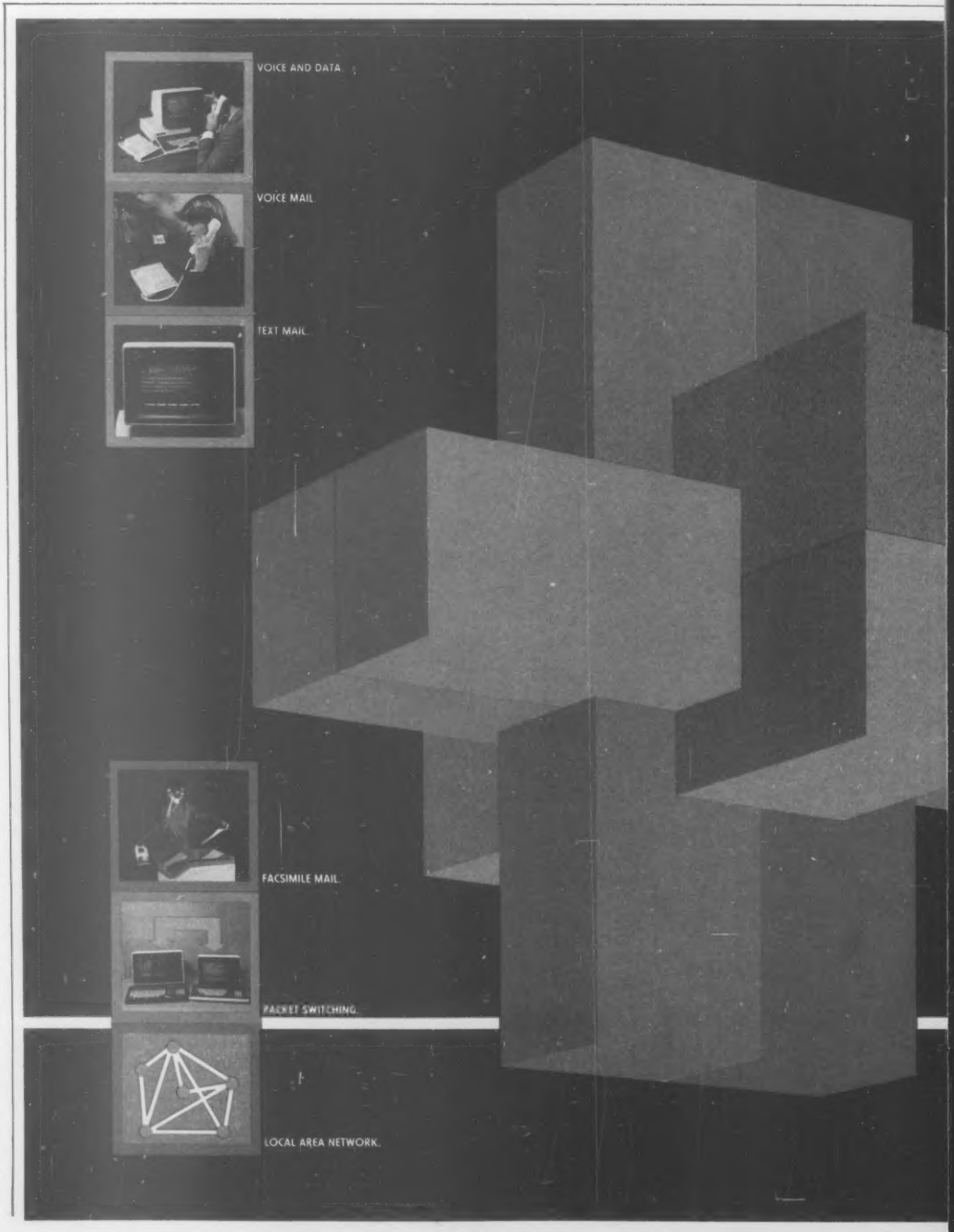
• Storage costs run less than one-tenth the cost of storage on magnetic materials like disk or tape. Because microfilm stores images in the same appearance as the original document, the user is generally accustomed to the format.

• With electronic indexing, misfiling of randomly microfilmed documents is nearly impossible.

When a communications interface is used between computer and microfilm units, a software program directs the search on the microfilm retrieval unit, eliminating all but a minimum of human intervention and increasing search accuracy.

In CAR systems, searches can result in one specific microfilm document or many. When a communications interface is used, the microfilm retrieval unit is automatically controlled to retrieve all frames in any cartridges that answer an information request.

CAR systems are primarily for medium-size to large users — offices where people must handle heavy volume quickly and productively. However, vendors are now seeing how some of the same capabilities in systems more suitable to the smaller volume application can be repackaged for smaller user. These capabilities



include filing-space savings of up to 95%; elimination of misfiling errors, lost files or misplaced files; efficient storage; low-cost, high-speed duplication and mailing of document images; ready retrieval; and easier document security.

However, micrographics offers more than ease of use; in cost considerations, it more than matches the most advanced technologies. The trend is toward simplicity, and typical products include the new tabletop microfilm cameras, which are operated very much like small copiers. Instead of full-size copies on paper, their product is a 16mm microfilm image. With internal film processing, no extra plumbing or wiring is required. Output is a filmstrip, generally of related subject matter; strips can be inserted easily into a jacket and become usable in an easily updatable microfiche format.

With a small, relatively inexpensive microfilm camera, the volume of microfilming need not be high in order to be practical and cost-effective. The copier approach permits the creation of microfilm in a single step, eliminating the two or three steps necessary with higher volume cameras having external processing, number encoding and other sophisticated features.

Other small-office microfilm systems are also in the works, such as low-cost, simple rotary and planetary cameras and simplified retrieval systems.

Besides CAR, another development that integrates the speed of electronics and mass-document storage capabilities is the special disk. These laser-written disks contain scanned images of 25,000 to 30,000 documents each, with extremely fast electronic retrieval. Targeted for widespread use by 1985, optical disk technology is viewed as a breakthrough in storage and retrieval. This higher cost technology will provide fast access to voluminous records.

Currently, auxiliary digital memory applications are receiving considerable attention, as well. One particular system, the direct read and write (Draw) optical recording system, features semiconductor laser scanning of a disk rotating at high speed. A higher intensity is used for recording than for reading.

Document input scan rates of 15 pages per minute are proposed; twice that rate is projected as techniques are refined. The Draw unit will record a digital frame for each page. The major attribute of the Draw system is random access to any frame immediately after recording, in contrast with the serial searches required for micrographic systems.

Pioneering installations are proposed for applications involving a million-page file where immediate access is essential. The cost probably will be in the million-dollar range. A number of basic material research problems will be needed to bring these systems into a cost/performance range for widespread usage.

Computer-output-microfilm (COM) can be a valuable tool to help DP managers cope with the growth in demand for automated information. A highly significant advantage of COM centers around the sophisticated software available for so many systems. With microprocessor control of format, job accounting, operator implementation, forms control and many other operational elements, modern COM systems can provide output that line printers or page printers cannot.

Micrographics offers more than ease of use; in cost considerations, it more than matches the most advanced technologies.

Basically, any output — alphanumeric or graphics — that a computer system can generate can instantly be put in fiche format or on a 16mm microform, with a wide variety of type sizes and fonts, special forms and special treatments such as highlighting and indexing. These features are generally presented in an extremely user-friendly manner, with a plain-English tutorial software package that guides the COM operator in setting up a job.

COM systems offering on-line capabilities provide still further advantages to users needing real-time output on microfilm. Typically, on-line output configurations simulate line printers or tape controllers to the computer system output.

Among present applications showing signs of major growth are outputs familiar in government, commerce and industry: price lists, parts lists, technical manuals, engineering drawings and statistical tabulations.

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The micropublishing techniques that make the production and distribution of these kinds of data quick, efficient, economical and eminently competitive are nourished by COM.

An application where COM may soon be felt is that of sysouts — the dumps of computer memory loads of data or programs for analysis or archiving. Another potential growth area is in businesses like insurance, where quantities of similar yet unique data outputs are required.

Considering costs, the advantages of COM are quite dramatic: Page printer hardware costs 1½ to two times more than hardware for many COM systems, and supplies run at least three times more on a page printer, according to users' reports.

It is axiomatic that the storage and distribution costs of paper-produced reports are many times those for microfiche duplication, storage and distribution. And these disparities will continue to increase as the volume of traffic increases.

We're barely viewing the tip of the iceberg. What lies ahead in the world of information management? Asked to project a potential information management scenario for 1990, one industry analyst conjectured:

• Record capture by intelligent microimage cameras with on-line or off-line processing will be in place. Data from the records will be captured to generate subsequent computer data bases including record location addresses. Access to the records on film will be provided either by COM printout of the indexes or by on-line inquiry via terminal, and transfer of addresses into an intelligent microimage reader/printer terminal. Microforms from both COM and document microimage cameras will be sent to the central microform file or to local files as directed by program control.

• COM applications will expand to include not only direct or off-line output of computer reports but also output from word processors for input to micrographic storage systems. Retrieval in these systems will be aided by computer-generated indexes or access to the computer data base.

• In some applications, graphics terminals will access the central microimage storage device. Microimages can be retrieved under program control, scanned and transmitted in less than five seconds. Prints can be obtained from integral printers, from an adjacent intelligent copier or from high-speed digital facsimile units at remote locations.

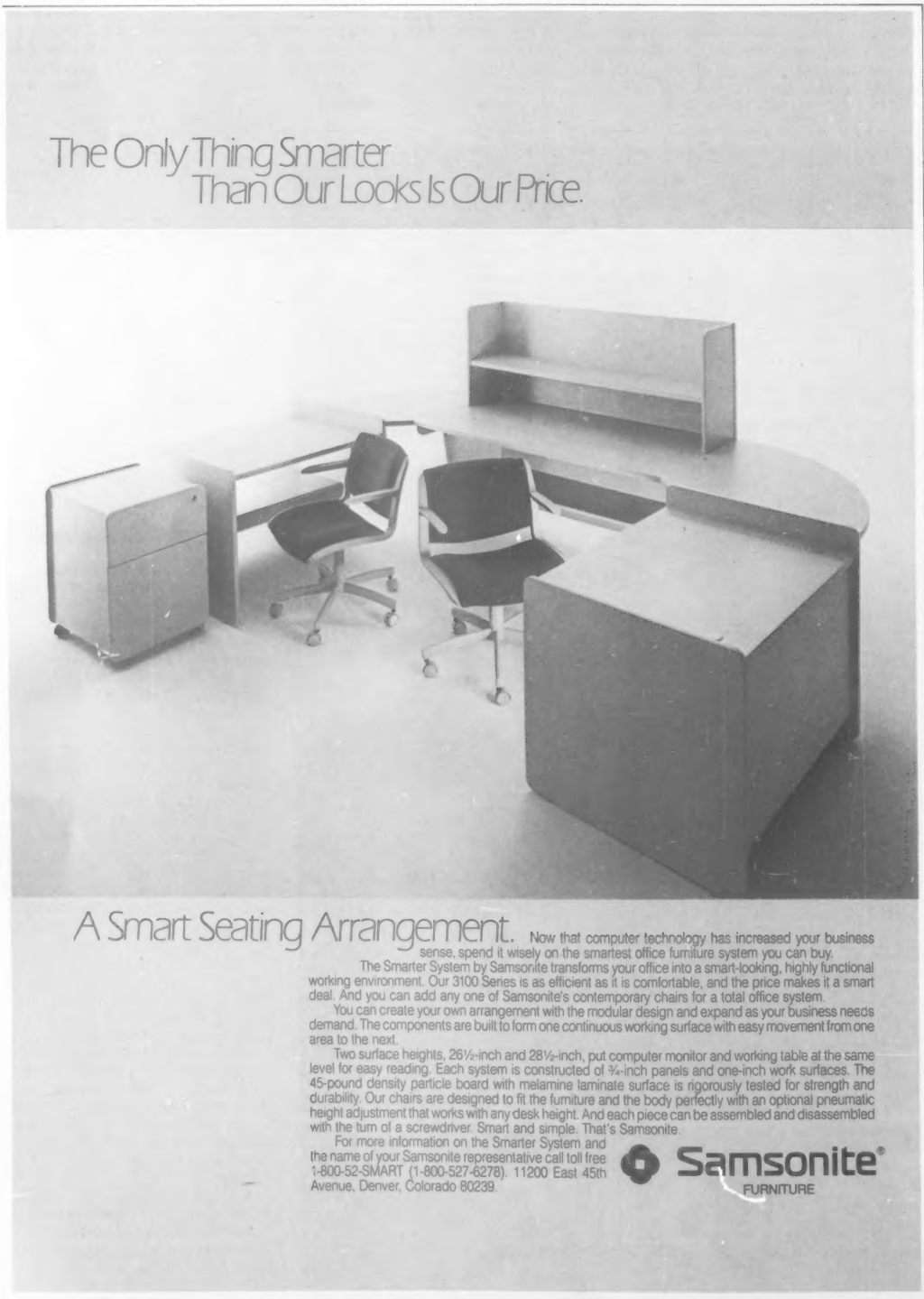
• Stand-alone micrographic filing systems will be in use for small office or departmental operations. These systems will use intelligent microimage cameras for data/record capture. Microprocessors will be combined with magnetic memories for file management and for storing the index and retrieval algorithms. Intelligent microimage reader/printers will be used for retrieval.

• A series of data bases connected primarily by program logic, with access by a variety of intelligent terminals, will be in broad usage.

Such a *Star Wars* scenario indicates that there is no single, best information management solution for every application or business. In actual implementation, the scales will be tipped by human factors and a heavy weight on grass roots acceptance.

Our objective is to improve human productivity, always keeping in mind that computers process data. People process information. OA

Frisvold is vice-president of 3M Co.'s Office Systems Division, based in St. Paul, Minn.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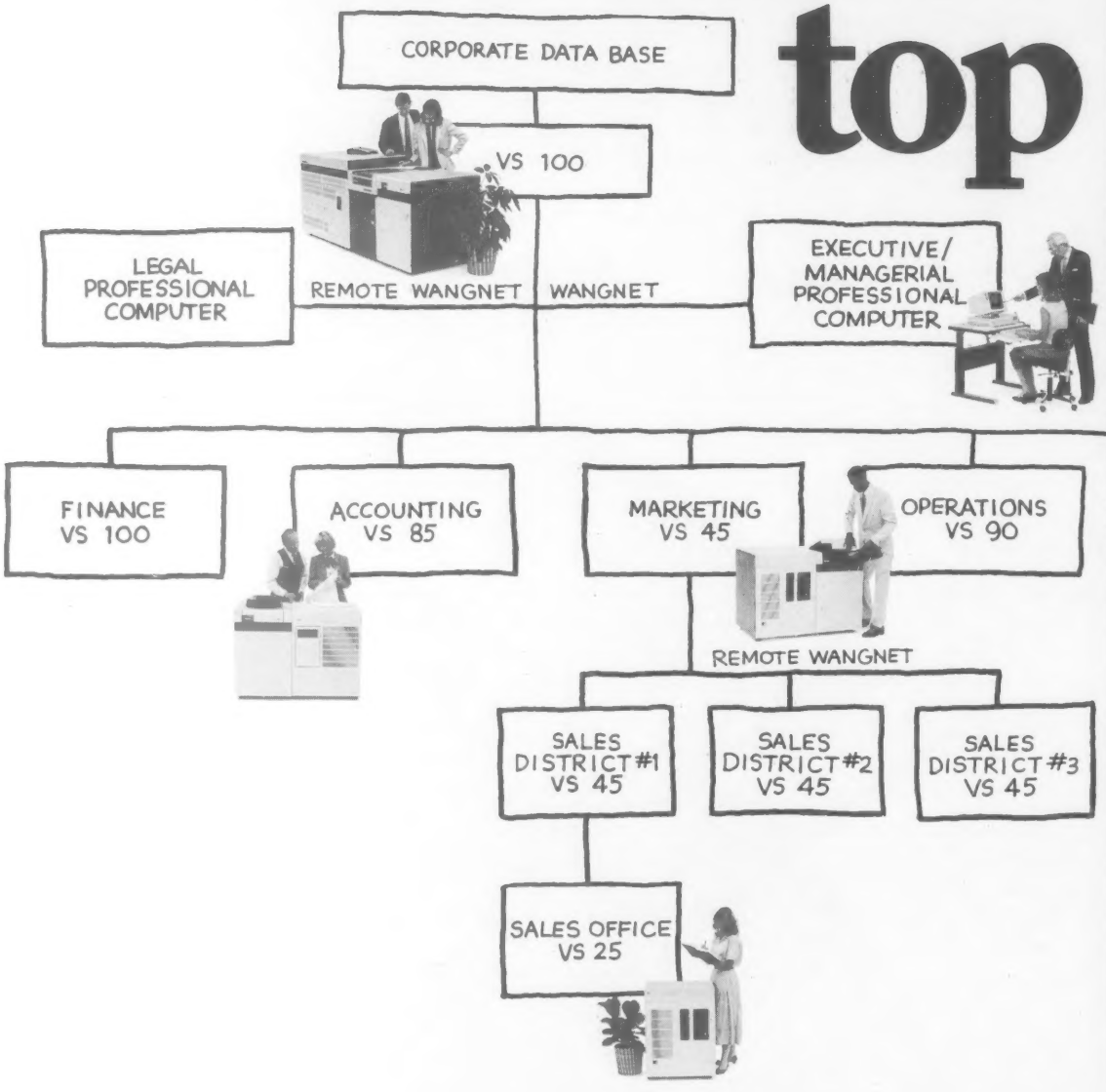

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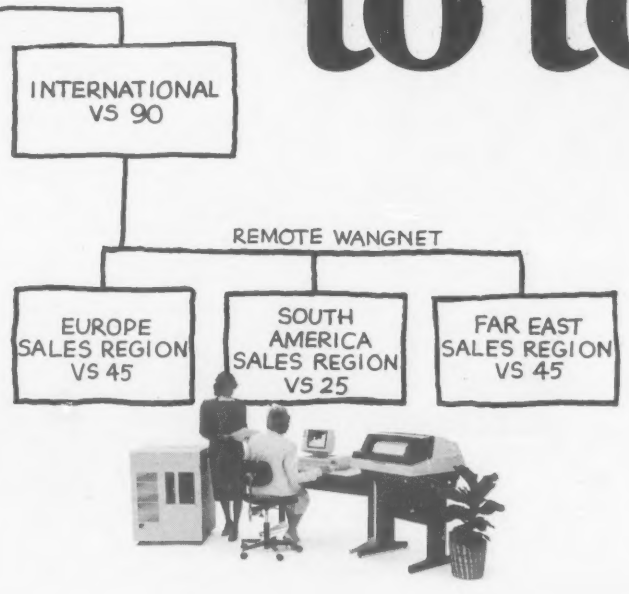

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BUSINESS GRAPHICS

BY BRYAN BUTLER

The optimum vehicle for management information is graphics — it provides concise summaries of the most relevant information in a format that is both visually appealing and easily understood by others. Graphics can shorten meetings, enhance communication and help managers make better decisions. More than 60% of a manager's time is spent in meetings, and many more hours are spent preparing for them by reading analyzing voluminous amounts of data and published reports. In addition to summarizing and executing the plans discussed in these meetings, managers must constantly update facts and figures to keep up with change.

(Continued on Page 48)

PHOTO © 1983 MORT RABINOW, CONGRAF INC.

Business Graphics Applications

By Raymond Jacques

Computer business graphics creates graphical output, including bar charts, line charts, pie charts and textual description to represent the data required by the businessman.

The most common means of recording a computer business graph currently is by using a flatbed plotter. This device uses a small table to hold a piece of graph paper in place while a computer controlled pen draws a graph on the paper. The computer-controlled arm draws all the lines on the graph in each of the colors, one at a time. When all the lines of one color are drawn, the arm puts that colored pen back in the pen holder and then picks up another color. The usual method to display a graph prior to recording it is on a graphics display terminal. A graphics display terminal is capable of representing various figures and shapes as well as numbers.

There are six key methods of recording the output of business graphics commonly used in corporations:

• ***Plots of business data on paper.*** This is the type of graphics referred to in the section above. In this type of graph, the computer is producing a plot of business data that would normally be done by the business executive himself with paper, colored pencils and a ruler.

• ***Plots made on color transparencies.*** Color transparencies are produced on the same plotter as the paper plots, but a special type of transparency material is substituted instead of paper. Pens are also used with quick-drying, nonsmear ink. Transparencies prepared this way are a superior alternative to flip charts in most situations.

• ***High-quality 35mm color slides.*** A high-quality 35mm slide is used for presentations where the occasion warrants the extra cost of providing the best quality visuals available. An example of this type of situation would be a presentation to the board of directors. The cost of having this type of slide prepared by a service bureau could cost $75 to $100 each. The cost of preparing the same slide using an in-house service would be approximately $35.

• ***"Peer quality" 35mm slides.*** These are used in situations that require the use of a 35mm slide, but don't warrant the cost of the high-quality slides. This slide would be used for presentations, usually within the company, to management at the same level as the presenter. The main difference is that the resolution of the image on the slide is not as sharp as the more expensive slides. Often, this type of slide does not offer as many options for colors, lettering styles or artistic options as the more expensive slide. However, the slide produced this way can be an effective means of communicating business data at about 10% of the cost of the premium slides.

• ***Interactive user-oriented graphics.*** These are used as an aid in communications between the computer and the user. An example would be in an application where the computer would be asking the user a series of questions in order to obtain information for a survey — for example, where the computer is surveying users about the type of breakfast they had that day. The computer uses graphics to illustrate the choices that may be selected, such as an egg, cereal or milk. The computer then analyzes the nutri-

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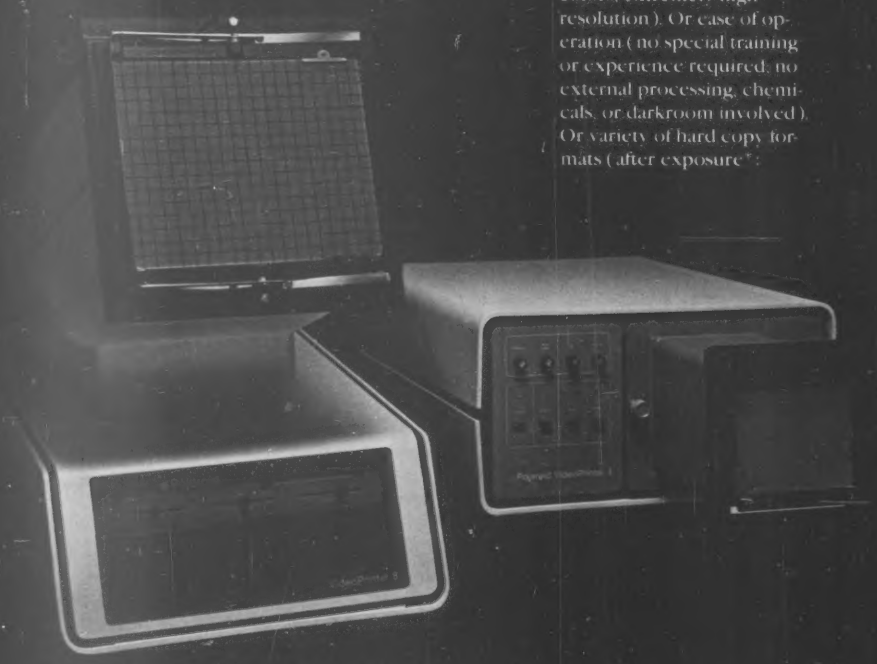

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tional value of the breakfast and tells the user whether or not his breakfast met minimum daily nutritional requirements.

• ***Geographical mapping.*** The computer can draw maps of cities, states and so on, showing key geographic features and superimposing a graphical summary of some key business data, such as market share.

The use of computer-generated business graphics can be of benefit in several ways:

• **Quality.** Computer-generated business graphics look better than graphs created by hand by a statistician, clerk or artist. The quality of the lettering is better, since the style is consistent and there usually are several options available. The graphs of bars and pie charts drawn by the computer are very accurate and neat. If your graphs require more complex grid lines and scaling, computer-generated graphics can do them accurately and consistently.

Some graphics packages allow for options in drawing artistic shapes that would be very time consuming if done by the average clerk. For example, a three-dimensional effect for bar charts or pie charts can be very effective and easily created by computer-generated graphics.

• **Cost.** An important benefit of computer-generated graphics is the savings in the cost vs. an equivalent graph done by hand. For example, a computer-generated color graph of a typical business graph consisting of bar charts would probably cost about $10 if done by a graphics service operated for internal use within a company. If an artist took one hour to generate the equivalent graph at an internal charge rate of $30 per hour, the equivalent graph would cost $30.

• **Turnaround.** The computer has the ability to create a graph very quickly. One major application is for use in tracking meetings. Typically, the format for the data and graphs for use in a meeting is predetermined and stays almost constant from one meeting to the next. If the graphs are to be prepared by the computer, the format of the graphs can be set up in the computer long before the deadline for the meeting.

The design of the graphs can be reviewed and modified beforehand, if necessary. When the data is available, all that is required is to update the data in the description of the graph and the graphs can be plotted. The actual time it takes to plot a typical business graph is about 10 minutes.

• **Accuracy.** Most computer graphics packages do the "scaling" for graphs automatically. For example, if you are using bars to represent monthly sales, the height of the bars is computed by the graphics package and the bar is drawn exactly to the correct height. This is one of the reasons why computer business graphics are inherently more accurate than hand-drawn graphics.

The other reason is that the computer assumes the burden of most of the rest of the detailed drawing, labeling and so on associated with creating a graph.

• **Get the Point Across.** Graphs simply are a much more effective way of communicating business data than the alternatives, which normally mean tabular business reports. It is much easier using business graphics to interpret the meaning of business data, analyze the trends and interrelationships and draw conclusions.‡ CA

Jacques is manager of management systems at General Mills in Minneapolis. The preceding was excerpted from a talk given at the recent National Computer Graphics conference and was printed with permission from the National Computer Graphics Association.

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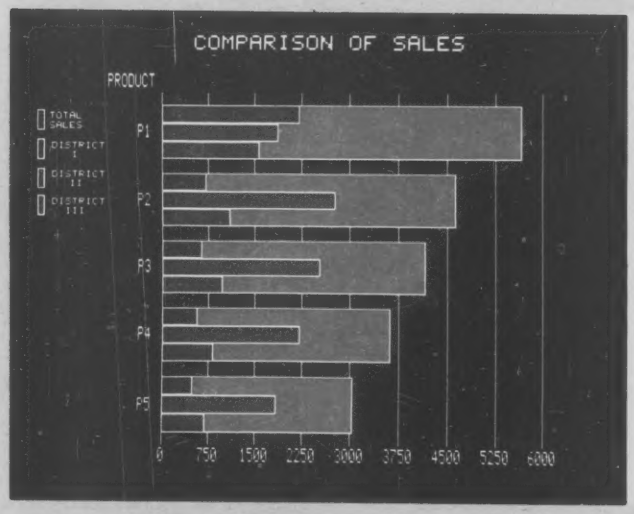

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(Continued from Page 45)

Although managers spend only about 8% of their time analyzing data, that time accounts for most of their effectiveness. An analytical aid that quickly shows trends, relationships, comparisons and exceptions will be very valuable to those managers. For example, it is much easier to grasp a company's competitive position by means of a multicolored pie chart than through several pages of statistics detailing where each division stands against competitors. Not only is graphics information more readily communicated and easier to analyze, there is also less likelihood that the relevant information will be misunderstood. Recent studies indicate information can be communicated up to 60,000 times faster in graphics form than in written form.

In the past, the cost of the traditional and usually time-consuming conversion of data into graphics has been prohibitive for many organizations. Now, however, graphics capability on all sizes of computers, especially the versatile desktop microcomputer, has brought this important business tool literally to the fingertips of thousands of managers. With the computer coupled to graphics software, today's manager not only has the analytical and communication benefits described, but can, with a few keystrokes, simulate new scenarios and create graphics representations of a string of future "what ifs."

A small slice of business life can illustrate these advantages. A manager arrives at the office at 9:15 a.m. and learns that, in less than two hours, he is scheduled to meet with the vice-president in charge of operations and the group's marketing director to give a presentation of a sales expense forecast for the next six months. The manager goes to the terminal and calls up last year's figures for the same period. Luckily, chart projections using sales growth of 10%, 30% and 50% with adjustments for various incremental increases and decreases have already been developed. Using these figures, the manager substitutes more recent estimates and produces termnal screen views with more accurate and realistic projections. He loads 8½-by-11-inch transparency media into the multipen, multicolor pen plotter linked to the computer. By 10:45 a.m. a dozen transparencies are ready. So is the manager — ready to make a presentation.

Managers can certainly make good use of graphics reproduced on their computer screens, but they can do even more with hard copies presented on transparencies or paper. Hard-copy devices such as plotters provide a permanent, transportable record, both for storage and presentation.

High-resolution plotters capable of small precise pen movements that will create smooth curves, characters and diagonal lines are the best choice for business graphics. Repeatability is also important. The plotter pen must return precisely to its starting point in order to define exact lines and to close circles. A good test of plotter's repeatibility is to check the alignment of bars and pie charts on a series of consecutive plots. If the edges of the charts match each other precisely, the graphics output will be professional-presentation quality.

Other important checkpoints are pens and paper. Pens come in three basic tip styles: fiber-tip, liquid-ink and roller ball. Pen widths can vary from narrow-tips for drawing grids, tick marks and small labels to wide tip pens that generate bold titles, heavy lines and filled-in areas. Graphs should be drawn on plotter paper or overhead transparency film. Standard bond paper's coarse surface can wear down the pen's point.

One of the biggest boons to the prospective user of business graphics is the growing availability of graphics software packages which not only simplify creation of a variety of graphs, charts and other drawings on a computer screen, but also provide the necessary signals to drive plotters or other hard-copy devices. The best of this software is strongly user-friendly so that the user only has to define or designate the type of chart or graph desired, specify colors and make sure that all the variable data has been input.

Graphics software is being developed by computer and plotter manufacturers as well as a legion of independent firms and individuals. Most programs are available through dealers and distributors that carry computer hardware and peripheral devices.

The microcomputer, combined with user-friendly graphics software and devices like pen plotters, is offering an economical and professional art department right at managers' desks. The office of the future will be still living in the past unless graphics capability is included. OA

Butler is product manager of Hewlett-Packard Co.

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OCR AND ELECTRONIC MAIL

BY PETER F. POLIZZANO

Electronic mail systems are proliferating in business offices around the country and are expected to continue to do so for years to come. The causes of this popularity are not difficult to understand. Conventional postal delivery, private hand-delivery carriers and even public telephone services cannot keep pace with business demands for message-handling systems that combine speed, assured delivery and reliability. The promise of steady growth in electronic mail for many business applications (and even for personal use) is already quite evident. The term "electronic mail" generally refers to various techniques for sending messages electronically by entering them through computers or other automated systems and transmitting them to remote terminals by means of telephone lines, data networks or space satellites. At the

Sincerely,

Ann Dooley

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receiving end, the message may be held on file for delayed delivery; immediately printed out and distributed as conventional physical mail; read on video terminals; or even converted to audio speech by means of speech synthesizers.

With recent advances in both software and hardware, electronic mail promises to become more efficient and more reliable than either conventional postal mail deliveries or standard voice telephone calls. Electronic mail messages can be transmitted simultaneously to many different locations where the messages can be stored and delivered to the recipient without delay. Contrast this situation with the frequent call-backs and frustrations now common.

Electronic mail can take many forms — Telex, TWX, communicating word and data processors and computer networks. These systems share the ability to transmit messages and text rapidly and reliably between two or more terminals by means of electronic links. Unlike more conventional message-handling systems, these messages are not delayed significantly in transit and the sender is secure in the knowledge that the message will reach the recipient.

Corporate managers who decide to establish electronic mail systems usually want to increase message-handling speed and efficiency while reducing overhead costs. Unfortunately, any new system that offers such positive benefits can be hampered by unforeseen problems which, if not corrected, can negate all the promised benefits. In the case of electronic mail, such problems usually involve an uneven flow of work to the center resulting in input bottlenecks, rekeyboarding errors and lack of compatibility between sending and receiving systems such as word processors.

OCR scanners can head off problems relating to the input and formatting of messages and the interfacing of dissimilar types of information processing and communications equipment.

Optical character recognition (OCR) systems may offer managers of electronic mail systems a way to cope with these problems. An OCR scanner is a device that can "read" information originally typed on a standard office typewriter or high-quality information processing printer. It then transfers the information it has read to various types of information processing systems, such as word and data processors and electronic message systems. With the scanner, messages and text can be input 50 times faster and much more accurately than when an operator manually rekeys the information at the workstation.

Necessary routing information can be added by the communications operator, who is no longer burdened with time-consuming rekeying. Instead, OCR converts most standard typewriters within the entire office complex into input terminals for the message center. As a result, the OCR scanner eliminates input bottlenecks. The personal secretary can now type an executive's correspondence, memos or reports, which then will be scanned and entered into the processor without the inadvertent errors commonly found when rekeyboarding.

The most advanced scanners offer these major benefits:

- Higher productivity: In some instances, productivity of an electronic message processor can be increased by as much as 400% through elimination of redundant, time-consuming and potentially error-prone rekeying.
- Reduced costs/labor: The tremendous improvements in speed and accuracy reduce office costs and labor.
- Expandability: By virtue of its processing speed and multiple ports, the scanner can accommodate future increases in work loads without any need for additional processing terminals or personnel.
- Fast turnarounds: By eliminating retyping and by using all available typewriters as input stations, OCR allows documents to be completed in a fraction of the time normally required. Peak work loads, common to communications operations, can be dealt with quickly.
- Better internal control: Because original material can be typed at the source, the material is likely to be more accurate. Priorities can be set by the individual executive without concern for outside influences, and absolute deadlines can be met with confidence.
- Media conversions: The latest OCR scanners can read text printed on one system and transmit it to one or more other systems that are not directly compatible with each other. Also, many scanners are capable of feeding scanned information to five different information processors, each requiring different protocols and code sets. With a modem, an intelligent scanner can be made to telecommunicate with any number of devices, both within an office complex and between remote offices.

Managers now planning to install electronic mail systems might want to evaluate the combination of special features and cost benefits characteristic of more advanced OCR systems. The scanner can play a vital role in heading off potential problems relating to the input and formatting of messages and the interfacing of dissimilar types of word/data processors or other information processing and communications equipment. These problems can seriously cripple an electronic mail system if they are not recognized and remedied prior to full operation.

Electronic mail as used here refers to communications techniques such as Telex, TWX, and communicating word/data processors. Virtually all the message and text traffic takes place in alphanumeric (nongraphics) form; therefore, most of this traffic can be accomplished with word/data TWX CBM (nonfacsimile) equipment. All these systems have the ability to transmit messages and text rapidly and reliably between two or more individuals by means of electronic links. Unlike conventional postal and telephone services, these messages are not delayed and are assured of reaching the recipient.

The following is a brief description of the application of a fully featured OCR scanner to each of these types of electronic mail:

- **Word Processors:** Clusters or networks of word processor workstations can be used to edit and format original textual materials and then transmit this information within a company or between remote locations outside the company. Within this network may operate a variety of word processors from different manufacturers, such as IBM, Wang Laboratories, Inc., Xerox Corp., Digital Equipment Corp., Lanier Business Products, Inc., NBI, Inc. and many others.

In this type of application, lack of attention to the input and interface problem can destroy the benefits of the system. For example, in a typical organization, letters, memos and reports are typed by administrative assistants and secretaries for executives and managers located throughout the building. These typed pieces are then relayed to the WP center and rekeyed into the system. After the message has been formatted, edited and approved, it can be transmitted electronically to one or more remote WP stations.

However, at least some word processors in this network may be a mix from different vendors and therefore not immediately compatible for direct communications.

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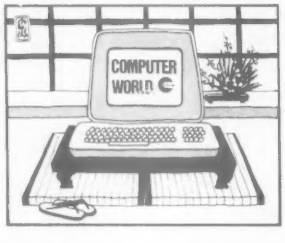

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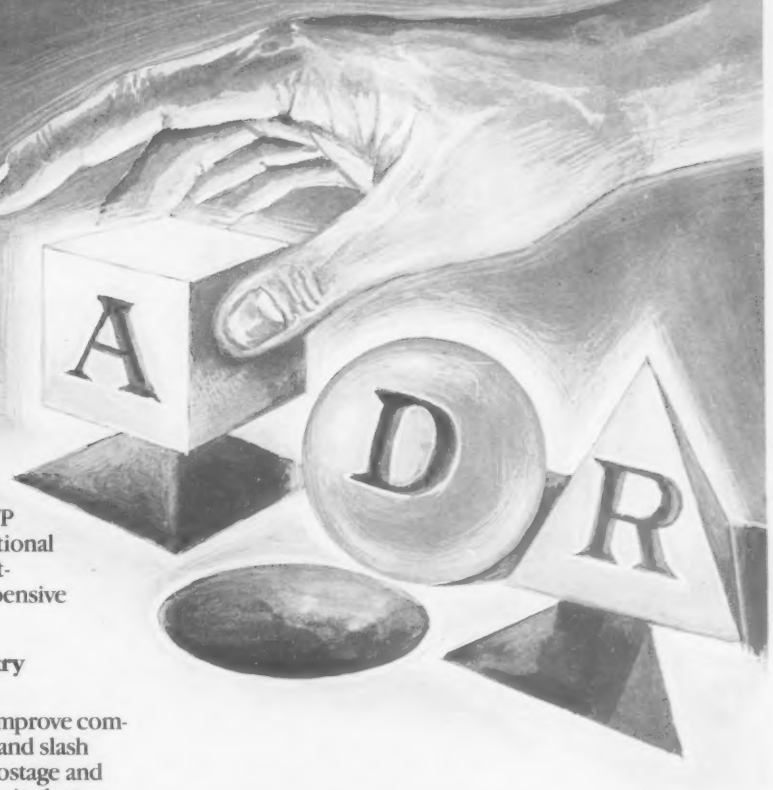

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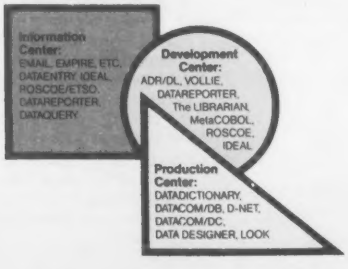

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Such a solution also necessitates a heavy commitment to employee training — different procedures will have to be learned for different devices. Additional operating time will invariably occur as well.

This interface problem is very real, but so is the input and format problem. A word processor cannot perform its primary mission of manipulating text while that text is being entered via the keyboard. At a typical corporate workstation, as much as 75% of a word processor's work-day hours are devoted to data entry; only a quarter of the time remains available for textual work. This is not only a tremendous waste of time and money; it can also lead to serious input bottlenecks.

An advanced OCR scanner can alleviate the input problem. One week's typing can be entered into the system in only one hour, with a resulting increase of throughput of as much as 300% or 400%. With an OCR scanner, text typed on standard single-element typewriters and daisywheel, ink jet and laser printers can then be scanned directly into the processors with no need to rekey, reformat or code-transcribe.

Not every OCR scanner can solve the interface problem, and potential users should make careful comparisons of available options.

Telex: Along with TWX, Telex is a relatively low-cost system with relatively slow transmission rates; text is limited to uppercase letters.

In practice, a message is entered at the keyboard at one terminal by a slow process that produces a punched paper tape. The paper tape containing the text is read in the paper-tape reader, and the resultant electrical signals are eventually transmitted by telephone lines to another terminal, which then prints a hard copy of the message. The keyboarding is a slow process (3 char./sec) and the transmission is also slow (10 char./sec).

In an OCR system, the original typed message is quickly scanned and either a paper tape is punched or the electrical signals emanating from the OCR scanner are fed into a message processor for eventual Telex transmission. The speed of transmission (10 char./sec) may be the same, but the text is on its way in 1/40 of the time.

Computer-Based Message Systems: These systems include existing in-house computer terminals that can provide the electronic mail function over internal private networks. A related technique involves remote computing and message time-sharing services.

As with word processors, advanced OCR scanners can ease the input bottleneck problem. The interface problem may not be a major factor because compatibility is normally designed into the communications network.

A series of remote terminals or small data processors from different vendors may be able to communicate directly with a central processor or with each other. However, more often than not, incompatibility exists. An OCR scanner that can solve the incompatibility problem will once again prove its worth many times over.

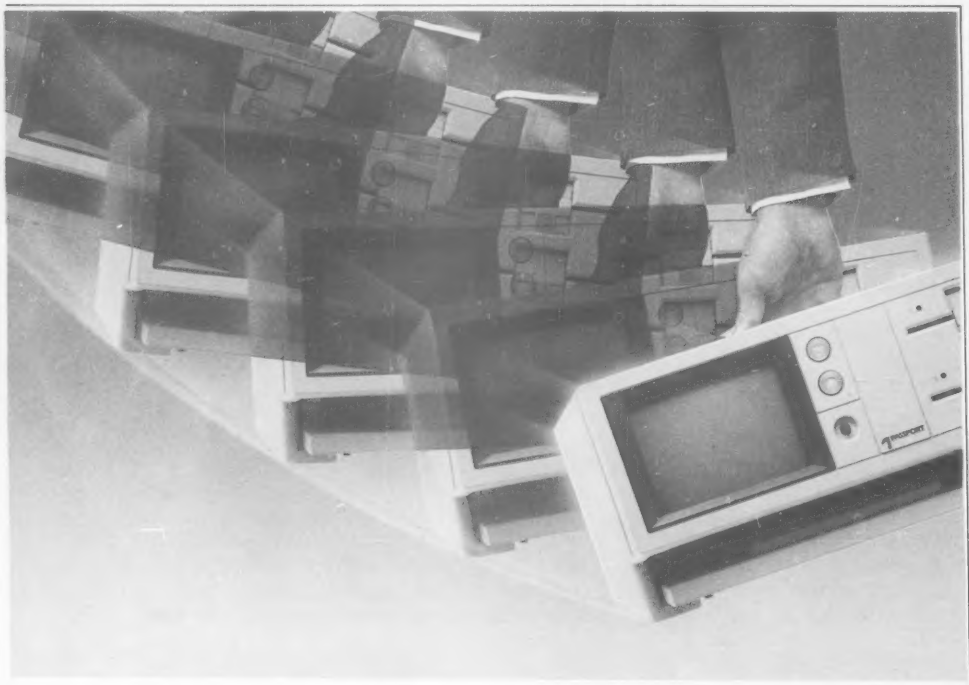
OCR Cost Analysis: Obviously, the cost of an OCR scanner depends on how well it suits the user's application. Regardless of the initial price, the true value of a scanner depends on its effectiveness to the user over the lifetime of its operation. A scanner with a higher initial price and wider range of capabilities may go far toward helping the user make his overall information processing operation more productive with the same or even lower overhead.

When the shift is made from manual keyboards to an OCR scanner, one scanner working with one workstation can often do the work of four workstations without a scanner — an increase of 400% in overall processor productivity. Today's advanced scanners can input more than 300 pages an hour, compared with a proficient typist's capacity of six to 10 pages an hour.

To state it more dramatically, in one hour one scanner can handle the volume of input that otherwise would require one full week. This pace is 50 times faster than the manual method, at a fraction of the cost and with much higher accuracy. In fact, the latest scanners offer error rates as low as one error in 300,000 characters.

An advanced OCR scanner can play an important role in resolving input bottlenecks in many business electronic mail systems. In most electronic mail setups, an OCR scanner may also prove useful in creating communications compatibility among diverse and otherwise incompatible communications equipment. By helping to improve the overall productivity of these message systems, OCR can contribute to one goal of most cost-conscious companies — maintaining maximum efficiency with the least possible overhead. OA

Polizzano is division vice-president of Compuscan, Inc., in Fairfield, N.J.



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OPTICAL DISKS

BY DAVID A. NADEAU

Optical disk technology offers users tremendous potential as a future mass storage medium for data and images. At this point, however, it is just that — a future technology. When optical disks do become practical on a commercial basis, they will necessarily be merged with other technologies and incorporated into other systems; they will not act as a stand-alone medium.

As technology develops, information users will still have a variety of systems from which to choose. Optical disks will surely be one of them, but others — some based on today's technology — also will serve.

Optical disk technology is an important development, however. A single disk surface can store 5,600M bytes of information. If the average document contains about 4 million bits (pixels) of

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information, this disk could hold more than 100,000 pages of information — the rough equivalent of 2,000 floppy disks or 50 magnetic tapes.

Why are document images needed when electronic or magnetic storage media are available? For two primary reasons:

• Studies indicate that only about 5% of the information contained on a document is ever entered into a computer data base. That leaves a significant amount of detail that must be stored elsewhere — traditionally on microfilm.

• Some features that occur on an original document — signatures, drawings and graphics, for example — cannot be entered into an alphanumeric data base. Easily captured on microfilm, these details are much more difficult and expensive to store electronically. Therefore, an alternative storage medium is needed. Optical disk poses promise as that image storage medium; for the near term, however, microfilm will probably continue to fill this need.

Optical disk technology clearly offers potential. Nevertheless, if technology leapfrogs from microfilm to optical disk without an interlocking technology, today's microfilm-based image/data bases simply would not be able to interact with optical disk systems. Users would be forced into a situation where they would either have to operate two separate, incompatible systems or encounter enormous conversion costs.

Instances could occur where users would want two distinct storage media. For example, it might be realistic to store an image on optical disk for the period of anticipated high retrieval — perhaps 90 days. For long-term storage, the image could be retained on microfilm to let users take advantage of microfilm's low-cost, long-term storage capability. However, without an interlocking technology to form a bridge between microfilm and optical disk, users would still have two separate, incompatible systems.

Such a bridge offers users two advantages: the ability to make all existing microfilm image bases interactive and compatible with optical disks and the ability to intermix the two media in a single, total system, using various media for different purposes.

Users would either have to operate two incompatible systems or encounter enormous conversion costs.

The technology that forms this bridge is called microimage transmission. Simply stated, this is the ability to electronically scan an image on microfilm, convert that image to a digitized bit stream and then transmit that image to a distant location for viewing on a CRT screen or for other forms of image processing.

The development of microimage transmission is based largely on current technologies and existing equipment, one of which is microfilm. An understanding of how conventional microimage retrieval systems work might offer some perspective. Today's advanced microfilm systems — called computer-assisted retrieval (CAR) systems — use a computer data base to store a microimage file address for each specific image. The corresponding image has an image mark alongside it on the microfilm.

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This technique is fast and accurate, but it has drawbacks. The manual element has not been eliminated. Although the computer electronically directs the microimage terminal to the correct image, an operator must physically locate the correct microfilm magazine and load it into the microimage terminal. In addition, when the image is displayed on the screen of the microimage terminal, the user cannot transmit it to any remote locations. The operator must make a paper copy of the image and send it to remote locations.

Microimage transmission would eliminate both of these drawbacks and would make possible a whole host of added benefits. Not only would the manual interface be eliminated, but also the following advantages would be achieved:

- A microfilm image could be transmitted to distant locations.
- A central microfilm file could be made accessible to remote users through a network connecting an organization's departments at one site or even at distant locations.
- Both images and alphanumeric information could be accommodated for simultaneous display on a screen.
- The image and related data could be processed.

The key to any microimage transmission system will lie in the ability to electronically scan a photographic image and convert it into electronic information. For this reason, a practical microimage transmission system would need the capability to computer-scan a microimage at high speed and to generate the corresponding bit stream. This scan technology could be employed in smaller manual systems or in fully automated files containing millions of document images.

In the automated files, robotic technology could be used to select the appropriate magazine and insert it into a scanner. A computer would tell the robotic device which magazine to select and, when the magazine was in the scanner, which image to locate and scan. The image would then be transmitted to a remote location and displayed on a high-resolution CRT.

Although the fundamental reason for developing the technology is the need to transmit the image, a range of other possibilities are opened up by the technique of converting an image to an electronic signal. When the image exists as an electronic bit stream, it can be read by a computer and processed. In addition to merely displaying the image on a CRT, users could enlarge or reduce it. Selected areas of the image could be viewed or printed. In fact, a user could request several images at once. The scanner would convert the various images to electronic signals and store them in a buffer. The document images could be viewed on a high-resolution CRT screen, which might also display some pertinent alphanumeric data alongside the document image.

Because the buffer can hold several document images, a user can "thumb" back and forth between individual images. The user can even change or add computer data to the screen and then make a paper copy of the entire screen, showing the original image and the amendments. In essence, users will have greater flexibility in

The key to any microimage transmission system will lie in the ability to scan a photographic image electronically and convert it into electronic information.

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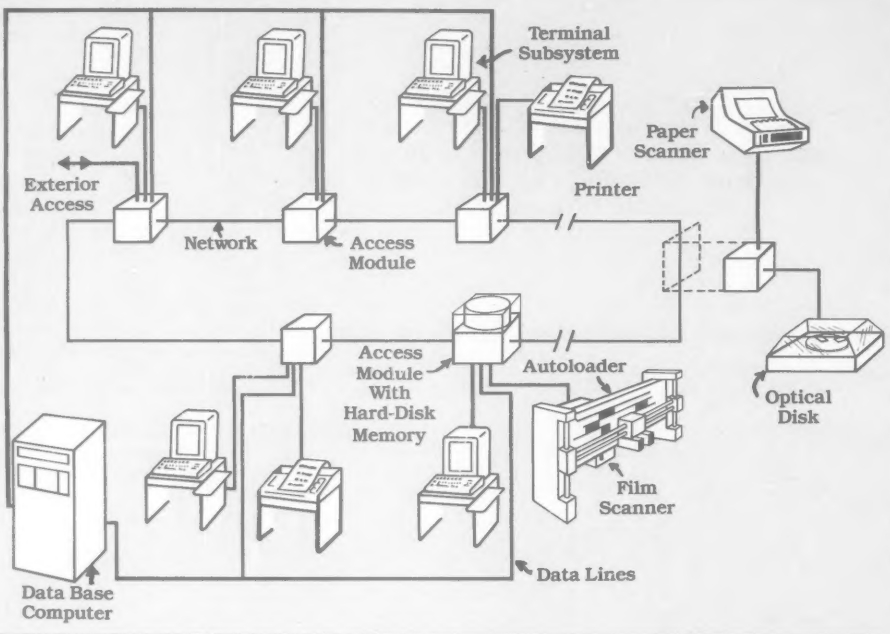

Combining new technology with proven systems, microimage transmission is both a stand-alone system and a bridge to later use of optical disks. As in computer-assisted retrieval, the data base computer (either a dedicated minicomputer or a mainframe computer) will store the index to a microfilm file and control retrieval. An autoloader and film scanner, built into the same unit, will replace the manual film files in use today. Data streams — from both the autoloader/scanner and the computer — will be transmitted to the requesting terminal over a local-area network.

User terminals will be similar to today's intelligent terminals with one major exception: They will have high-resolution CRTs to permit viewing of fine details in the document images. The terminals also will be able to manipulate the images, enlarging or reducing them, dropping out unwanted detail, and permitting sections of them to be printed out on high-resolution printers. The terminals also will display both image data and computer data at the same time, permitting the operator to access all information needed at a single workstation.

As technology is developed, the optical disk unit will be able to be placed into the network. Microimage transmission and optical disk technology will not be mutually exclusive; the two will be able to exist side by side.

terms of processing the image and corresponding data. Microfilm will no longer be merely a static storage medium.

Microimage transmission will make everything happen faster than it does today, and productivity will be greatly improved in the process. Many manual tasks will be eliminated. Instead of working with several pieces of equipment (a roll film reader, a CRT terminal, perhaps even a microfiche reader), a user can accomplish all data and image retrieval via one terminal.

A wide range of information-handling systems will benefit from microimage transmission. In the initial years, however, those who benefit most will typically be organizations with large image/data bases, either microfilm or paper-based. The nature of work done in these organizations normally requires frequent retrievals, with many users accessing the same image/data base. In these cases, the microimage transmission system will cost-justify itself with the same labor savings common to today's users of advanced CAR microfilm systems.

The heart of any microimage transmission system, however, is that vital and familiar computer index employed in today's CAR systems. When this index is joined with microimage transmission, not only do users gain the ability to access the central file from remote locations, they also are able to enhance and manipulate those images.

Beyond this intermediate step of microimage transmission, optical disk offers image and data storage flexibility and potential. Because that technology also employs an electronic scanning capability, it will be interactive with microimage transmission. This total information system can be visualized as a series of interconnecting triangles. One corner of the base represents nondigital, permanent information, with microfilm and paper as the storage media. At the opposite corner of the base is permanent information stored in digital form, either on magnetic media or optical disk. The third aspect of the system comprises the temporary display of information on a high-resolution CRT.

At the center is the transmission medium through which all components of the system interact. Here the information is captured and relayed to other parts of the system, with gateways possibly offering access to and from other networks.

In the not-too-distant-future, a user can sit at a single high-resolution CRT terminal and call up various images — regardless of whether they are stored on microfilm, optical disk, or magnetic media. All will be compatible and interactive. OA

Nadeau is director, Electronic Imaging Systems, at Eastman Kodak Co., Rochester, N.Y.

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CAR AND MICROS

BY DAVID T. BOGUE

By the end of this year, software programs now under development will make microform image-based document storage and retrieval an affordable option in any office setting. A number of personal computer models already on the market will serve as the key to this new capability. Instead of spending as much as $100,000 on existing computer-assisted retrieval (CAR) systems that operate on mainframe hardware and use more complex equipment, most businesses will soon be able to participate in office automation through the purchase of micrographics office filing systems linked to personal computers. The

PHOTO ... MORT RABINOW, CONGRAF INC.

Manufacturer	Model	Reduction	Film Size Output	Document Size (In.)	Approximate Cost
Alos Micrographics Corp.	Recorder 24 Step & Repeat	24x	105mm by 148mm cutsheets	8.5 x 12	$ 5,000-$10,000
Canon USA, Inc.	161G-B	24x	16mm roll film	10 x 15	$ 5,000
Data Conversion Inc.	EOM 6100	24x, 42x	16mm strips	8.5 x 14	$ 5,000-$10,000
Fuji Photo-Film USA, Inc.	Micro 1200	25x	16mm strips	10 x 14	$14,000
	5R 300	40x	16mm roll film	checks to letter size to 9 wide	$ 6,500

Figure 1. Office Microfilming Systems Camera-Processors

entire system will cost as little as $20,000. What is ahead for CAR systems? One example, a special personal computer software package available under the Pick operating system, is currently being developed by Acctex Info Systems Corp. for use in CAR applications. The program is intended to operate eventually on IBM Personal Computer, Osborne Computer Corp. and Apple Computer, Inc. Lisa hardware.

Ultimately, the entire CAR configuration will include use of the personal computer for micrographics-based document storage and retrieval indexing, an office microfilming camera/processor system for recording document images on rollfilm or fiche and an automatic micrographics retrieval unit for displaying film images stored in cartridges.

Initially, the new software package will facilitate the linking of an IBM or IBM-compatible personal computer with a mini or mainframe system for downloading of data and other automatic document storage and retrieval functions. Later, software refinements will allow CAR to be used with most stand-alone micro systems, after data is extracted from mini or mainframe operations. In all cases, a formatted screen will be employed for data entry, with input of word assignments to identify each document to be stored. The program will also help manage proper input by teaching users how to enter data through use of a menu prompting system.

The primary purpose of the computer in a CAR system will be to retain the description and address (location) of each record to be stored, either by file number, file name or a combination of descriptors. The first component of the CAR system is a microfilming camera for document image capture. This could be a flow, step and repeat or planetary camera. As the document image is recorded, a sequence number may be imprinted on the filmed image. After processing, the document film is loaded into a cartridge and indexed by roll number, sequence and date.

The sequence number, which now functions as a location address when combined with the roll or file number, is entered in the computer by an operator at the data capture station. This information is transferred from the microfilm image and is input along with all necessary document descriptors. Alternatively, the location and indexing information could be entered into the computer from the paper document itself during the data entry step.

When a particular record is required, the computer prompts the user to enter the descriptors or search parameters that describe the document. For example, assume the user is a lawyer who requires a document concerning litigation between the plaintiff, Monark, and the defendant, Orion. After entering Monark and Orion as parameters via the keyboard, the user receives a message from the computer indicating that there are 3,000 hits, or documents relating to Monark vs. Orion. The lawyer doesn't want to look at all 3,000 documents; he can narrow the search by adding other descriptors for the specific information he needs.

The lawyer keys in additional data; he is interested only in documents that relate to the period from February 1976 through August 1976. The computer responds in turn that 100 documents meet these requirements. Because 100 documents are still too many to look through, the lawyer specifies that the documents refer to men named Petty, Weeks or Clayton. In response to these parameters, the computer indicates that only five documents meet all requirements.

The search is then halted and the user is prompted by his terminal to load a specific cartridge of film into the retrieval device (microfilm reader). After the correct cartridge is loaded, the device, under computer control, moves the film to the correct image location; the lawyer's document image is then displayed on the reader screen. If required, a paper copy can be generated. The cartridge is then rewound by the retrieval device and the user replaces it in the cartridge file.

A personal computer-driven CAR system will offer many advantages in a broad number of information management applications. These applications may range from maintenance of correspondence, accounting and credit files to upkeep of insurance claims processing and customer service records systems.

The following benefits in improved productivity and cost-effectiveness can be expected with CAR:

- Reduction in costly file storage space.
- Increase in data (document image) retrieval speed and response time.
- Control of head count by minimizing clerical manpower for file maintenance.
- Improvement in overall document file integrity, security and organization.

In addition, the personal computer itself will offer special advantages in efficient management of business information. The hardware/software combination will overcome the limitations of storing indexing data on computer systems developed primarily for on-line purposes. At the same time, networking with other personal computers will also be possible. This will facilitate a sharing of the document index with a number of separate workstations. Records indexing (input) and image capture (microfilming) will be controlled in one central area, therefore duplicate microfilm can be issued quickly and conveniently to many data access locations.

As companies grow, various personal computer multitask software packages — encompassing word processing, spreadsheet, decision support and graphics capabilities — may be combined with local-area networking. This could lead smaller businesses into more extensive OA on a transitional

Manufacturer	Model	Microform Used	Interface	Approximate Unit Cost
Eastman Kodak Co.	IMT 150	16mm cartridges 2,000 - 5,000 image/cart.	Computer terminal interface	$14,000
Consolidated Micrographics Inc.	Model 95	Microfiche cartridge 2,880 - 9,000 image/cart.	RS-232C interface	$ 3,930
Information Design	ADC-3AC	Microfiche cartridge 2,880 - 9,000 image/cart.	Computer interface MPU control system	$ 3,000-$ 4,000
Icot	M-380 automatic reader	Ultrastrip cartridge up to 100,000 image/cart.	RS-232C interface	$ 9,000
3M Co.	Model 900 EF6000 page search	16mm cartridges 2,000 - 5,000 image/cart.	PST systems interface MPU controller	$10,000

Figure 2. Interfaceable Micrographics Retrieval Units

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There are currently 15,000 installed computers on 12,000 sites in Mexico. These include mainframes, medium and small computers as well as personal computers. Experts forecast the sale of small, medium and large computers to grow at an average annual increase of 20% during the 1980s, despite Mexico's current economic problems. Minicomputers will be in great demand since they are small, affordable and efficient. U.S. manufacturers have maintained a 80% market share for the past three years with sales of over $182 million. *Computerworld/Mexico* can bring your message to 10,000 key-decision makers in the Mexican computer community. Published on alternate Mondays, *Computerworld/Mexico* covers all the latest developments in hardware, software and terminals in addition to data processing and computer related subjects. Its goal is to provide useful information to data processing professionals throughout Mexico and Central America.

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basis, keeping pace with individual corporate growth trends.

Soon personal computers will probably also be able to download active data to generate production of computer output microfilm (COM) as part of CAR operations. This process would be accomplished by recording digitized information directly on floppy or Winchester disks and effecting its transfer to magnetic tape run on mainframe computers connected to COM production equipment, either in-house or through a service bureau arrangement. Figure 1 lists some camera-processors available from major manufacturers.

Automatic retrieval units already on the market have the ability to contain from 8,000 to 150,000 pages of information on microfilm, and they can be interfaced to a number of personal computers. Figure 2 lists some of these units.

As an alternative to building a CAR system that immediately incorporates an automatic retrieval unit, the user may choose to purchase microfilm reader/viewers that are not computer driven. If this choice is made, location of the desired data is still computer directed, but actual retrieval of the required document image is effected through a desktop film box/file system. With this option, the cost of the retrieval end of CAR can be held under $400. Microfilm reader/viewers are available — in hand-held, portable and desktop models — from NMI, Microdesign, Inc., Micron Corp., Datagraphix, Inc. and Alos Micrographics Corp.

The selection of a CAR system requires a careful evaluation of the type of files to be used and an understanding of how the user needs to access desired records. The activity level of the file should be determined as well as the physical characteristics of the documents. The capabilities of the available CAR systems must then be matched to the specific requirements of each application.

Regardless of application requirements, the following traits are desirable in any CAR system:

• User-friendly software. The software should be simple enough for personnel to learn and operate. (The new personal computer software under development was designed to meet this need).

• Flexibility. The CAR system should be able to retrieve images on a microfilm retrieval/viewer device best suited to the user's requirements. And, when necessary, the CAR system should be able to communicate with other computers to take advantage of indexing data that may already be available.

• Modular growth capabilities. Software and storage capacities should be expandable to meet current and anticipated needs.

• Rapid retrieval characteristics. System performance may suffer when maximum file sizes are in use. The system should be powerful enough to meet retrieval speed requirements even under a maximum work load. Multiple search parameters should be provided to increase retrieval power.

• Reliable operation. The reliability of the total system should be evaluated, including computer, software performance, camera and retrieval units. Available service support and backup capabilities for the system should be investigated.

By careful selection, users can obtain a CAR system that will provide immediate cost-effective access to vital business information. OA

Bogue is vice-president of advanced technology at Zytron, a microfilm product services organization in Menlo Park, Calif.

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Unix Spreads

PHOTO © 1983 CHRIS TURNER, CONGRAF INC.

Into the Office

BY GLENN RIFKIN

Unix, Bell Laboratories, Inc.'s ubiquitous operating system, is at the center of a growing storm of controversy. At the same time Unix is being heralded as the de facto standard for the 16- and 32-bit minicomputer and microcomputer market, its rise in popularity has brought a great deal of cynicism from its detractors.

Among the questions that stir debate is where Unix will fit in the office environment. Proponents feel that Unix and office automation are like peanut butter and jelly, a perfect match. Others believe that the user public is being misinformed and that, in its present state, Unix just can't accommodate the end-user arena.

"Unix looks like the best chance we have for a multiuser, business-oriented office operating system that will run across different brands of computers," said Jean Yates, president of Yates Ventures, a Los Altos, Calif., consulting firm. "However, that doesn't mean it's great. It's not that wonderful, but there's really no alternative."

Talking to a programmer, Yates would certainly get an argument. Designed by programmers for programmers at Bell Labs in 1969, Unix has been termed "elegant" and "versatile." "As a programmer's interface, it's beautiful. It's clean and it doesn't get in your way," Bob Marsh, chairman of Plexus Corp. and director of the Unix/Usr Group, said.

If numbers tell the story, Unix proponents are making their presence felt. As of December 1982, Unix had made its way into more than 5,000 educational, governmental and commercial installations and those figures are growing daily. According to Yates Ventures, commercial sales of Unix and its many look-alikes on the market will total 95,000 units valued at $2.1 billion in 1983. By 1986, Yates predicts an installed base of 1.3 million units, sales of 500,000 units for 1986, with a total market value of $6 billion.

An interactive, multiuser, multitasking operating system, Unix combines many features no other operating system can boast, according to its boosters. In addition to its flexible kernel (the core of the operating system responsible for handling basic system functions), it has a hierarchical file system, which bypasses much of the file and program manipulation and maintenance needed in other systems. Unlike the cumbersome, interrelated programs with the jumble of commands of other operating systems, the Unix system is a set of small, separate modules, each of which can be used without affecting the operation of the others.

Unix has a unique shell command language which also serves as a programming language that provides an interface to the operating system. The shell structure allows the user to avoid programming completely by using Unix commands in the form of pipes and shell scripts instead. Its flexible design has been called ideal for developing software applications.

Unix also has a selection of interactive debuggers and more than 100 utilities (or tools) for file and string manipulation. It is transportable across hardware architectures, and this ability to run on micros, minis and mainframes is considered Unix' number one attraction. Although most operating systems were designed to be married to a certain piece of hardware, Unix was designed to be easily customized to both hardware and applications. Its ability to communicate not only across architectures but also across vendor brands makes Unix an invaluable asset in the multivendor environment of the office, according to Unix proponents.

In addition, Unix has the advantage of being a time-tested product. Bell Labs has implemented several versions of Unix over more than a decade of varied use. "It's a mature system," said Dr. Charles Popper, manager of advanced systems and planning for Lehman Bros. Kuhn and Loeb in New York. "The bugs are out of it."

Until January of this year, AT&T refused to sell and support the Unix system, which it considered a technology and not a commercial product. However, for a minimal charge, AT&T did provide Unix to universities and research facilities during the 1970s. Its multiuser, multitasking format made Unix ideal for those settings, and students and professors built on and enhanced it in a myriad of ways. Having used Unix in school, the former students brought their desire for the product to their work environments and Unix' popularity began to soar.

Despite its army of admirers, Unix is not beloved by everyone. It has been criticized as being extremely unfriendly to anyone other than programmers; of no use for real-time processing; lacking applications software; lacking enough power to handle complex office systems; and not being properly supported by its vendor, AT&T. "There's tremendous potential out there, and the idea of

portability is very appealing," Yates, who has authored five books on Unix, said. "But the actual implementation is not happening as rapidly as we might like — the single biggest stumbling block being the Bell System."

According to Yates, Bell must offer better support. In January, Western Electric announced System V, its first commercial version of Unix, but in Yates' view it simply isn't enough. For example, System V throws out a "grab bag" of 400 utilities and programs and says "pick among them." The experienced user likes it that way, but the business user "is just totally confused," she pointed out. "The systems integrator or the Fortune 1500 companies have to spend a lot of time and energy fixing the product."

'System V throws out a "grab bag" of 400 utilities and programs and says "pick among them." The experienced user likes it that way, but the business user is totally confused.'

Major OA vendors have also expressed skepticism about Unix' place in the office. Wang Laboratories, Inc., for example, simply does not believe Unix will be the dominant operating system in the office of the '80s. According to Charlie Johnson, Wang's director of product marketing for computer systems, vendors selling Unix for the office have added as much code onto the basic Unix as there is Unix itself. Having been designed for system-level developers, he said, Unix is not friendly at all to the end user.

Johnson said he believes Unix won't provide enough power in a multiuser environment. "People who have delusions of having 20 workstations on a 68000 running Unix will see there just is not enough power."

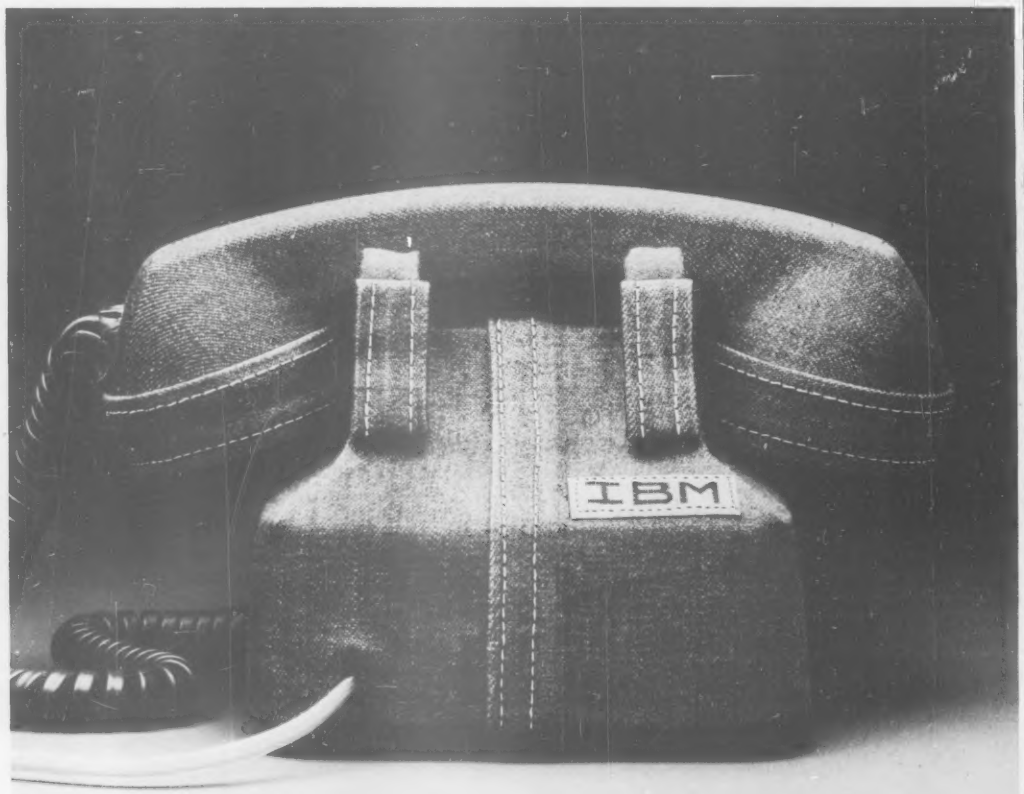
Unix' transportability is also a "misconceived notion," he said and added that highly transportable versions exist, but they run in the C language only. There aren't many programmers out there who know C.

"If Unix is going to be a standard in the office," Johnson stated, "it's got a long way to go. As free-standing Unix, it's questionable whether it will get there at all."

Digital Equipment Corp. has also questioned Unix' place in the office. Dec recently came out with its own version of the product called V7M-11 after nearly 14 years of refusing to acknowledge Unix. Despite the fact that Unix had been created to run on DEC minicomputers, the company "took a while recognizing it was not the university toy it started out to be," according to Bernie Toth, Unix products marketing manager for DEC.

As interest in Unix soared, DEC finally accepted its inevitability. "Since we were a major supplier of systems using Unix," he said, "it made sense to get involved." Despite its grudging acknowledgment of Unix, DEC still holds firm that Unix is not the operating system for its office products. DEC's office products are not Unix-based and there are no plans to change that.

"Unix is really terrific for the techie. But in the



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office, there is too much to do to make it user-friendly," Toth said.

Unix is also weak in networking capabilities and data base management systems, according to its critics. Toth feels that end users in the office shouldn't have to be concerned with the operating system at all. The tools built upon that system should hide it.

From AT&T's point of view, the criticisms are misplaced and currently unfounded. According to Bell Labs, when Unix was being developed, it was considered a technology, not a product, and therefore wasn't going to be treated and supported as a commercial entity. With the coming divestiture, the company felt the time was right to explore the market created by third parties. For the first time, the Unix system offered outside Bell is the same as that used inside.

Catherine Brooks, a supervisor in the Applications Planning Group at Bell Labs, said Unix provides an ideal environment for developing office systems. Tools such as electronic mail and calendaring have been successfully incorporated into Unix. Bell Labs has automated its offices for professional workers using Unix, she said, although certain specialized extensions were done internally.

Unix has a strong text editing capability with its NROFF and TROFF functions, according to Brooks, and provides additional packages such as TBL (for producing tables) and EQN (as an equation processing function). Unix' Writers Workbench, a software editing tool, is also available as an option on System V.

With divestiture on the horizon and AT&T looming as a formidable player in the information systems game, Unix appears to have the momentum to overcome most of the criticism. Though the major vendors would be happy to go on selling their proprietary operating systems and let the compatibility issue creep along, Unix, its backers believe, is already approaching standard status.

"I've heard those objections for five years now," said Frank Madren, vice-president of marketing for Pyramid Technology Corp. "Meanwhile, Unix has increased monstrously. The variety and quantity of Unix-based office automation products continues to grow and gives an alternative to major vendor-developed solutions."

Pyramid recently announced a Unix-based 32-bit supermini called the 90X. According to Madren, it was simply a business decision to go with Unix. Other superminis are available with proprietary software from the manufacturers while Unix, with its growing aggregation of software and its position as a standard, is becoming more and more attractive to the user community.

With divestiture on the horizon and AT&T looming as a formidable player in the information systems game, Unix appears to have the momentum to overcome most of the criticism.

"As you approach the OA problem, any one vendor is almost swamped. They can't be all things to all people. Unix provides an alternative because it gives the OA user the ability to pick and choose software," he said.

Applications software, once considered a scarce commodity for Unix, is being produced at a frenetic pace as Unix gains popularity. "It feeds on itself," said David Kaplan, senior vice-president of technical operations for Fortune Systems, Inc.

Fortune, with its Unix-based 32:16 microcomputer, is just one of a growing list of manufacturers that have chosen Unix. According to Yates Ventures, more than 70 hardware vendors currently produce Unix-based products, and that number will reach 100 by next year.

"The old-line manufacturers have a big stake in their proprietary products," said Plexus' Marsh, "but a lot of the office automation companies are announcing OA products based on Unix. People will use Unix in the OA area as a way to tie old products into the new technologies. Unix just has too many right things going for it."

DP managers exposed to Unix tend to agree. Albert V. Filippini, senior systems analyst for Commercial Union Insurance in Boston, pointed out that Commercial Union has been running Unix since 1975, having received one of the first licenses from Bell.

Commercial Union uses Unix in both a DP and an OA environment and it has met with tremendous acceptance from the user population. Currently, 150 users employ the Unix-based system for electronic mail, communications, financial applications and a local-area network. "Time-sharing and OA have just blossomed here because of all the wonderful things we can do," Filippini stated. "Unix supports the total electronic office. We even run lunch menus on it."

Filippini conceded that, because of lack of support from Bell, he had to assume those responsibilities over the years. However, as a programmer, he had little trouble with that task. "I think Unix is the best thing since sliced bread. I can see, from a user's standpoint, what the problems might be, but you can make Unix user-friendly enough so they won't even know they're using it."

Popper, of Lehman Bros. Kuhn and Loeb, said he is convinced Unix is destined to be the dominant operating system in the next decade. Lehman Bros. has three Unix-based Zilog, Inc. System 8000s and 10 Fortune 32:16s supporting word processing and professional workstation applications in place of personal computers.

Unix could be improved in such areas as real-time processing, he said, but any major changes would detract from its strength as a de facto standard. Customization might be better, but it would be much more expensive. "Unix' advantages in the OA environment are its modularity and its ability to plug OA products from different vendors together. It's not easy to take the Lotus 1-2-3 product and marry it to your word processing and other data bases. We've already done it with Unix."

For Yates, the enchantment with Unix comes as no surprise. She claims she was at the head of the pack in support of Unix in 1979. Her current cynicism comes from her clients — small start-up companies to large manufacturers — that have had continuing headaches with the product.

"I constantly hear 'it's going to be important and going to be the operating system of the '80s, but boy, is it a pain to get working and boy, do you get no support from Bell.' There are companies who, since '79, have been promoting, selling, educating and advertising Unix and begging Bell for support — and it still hasn't happened. Since the vendor of Unix isn't making the moves they need to make and the product needs so many fixes, a great deal of unnecessary money and energy is being spent getting the product to market. It's very frustrating," she said.

Despite her objections, Yates admits that Unix has captured a lot of industry hearts. At its best, Unix appears to be the long-sought-after answer to many in the office market.

"It does work for office automation," said Commerical Union's Filippini. "We're living proof of it. Our secretaries have been using Unix for four or five years now and I wouldn't want to tell them they couldn't have it anymore." OA

Rifkin is a staff writer for Computerworld OA.

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What's Happening At IBM?

What's on IBM's drawing board is always of interest. Here's a sample of what might be coming.

By August L. Kelsch

Certain products now in development may have a significant impact on work being done in offices around the country. The following includes some of the technologies particularly related to IBM sites.

Software: Currently available software tools (and those in development) can help principals create grammatically correct documents without their secretaries' guidance.

Proofer: Proofer was a spelling-checker program used at the IBM Thomas J. Watson Research Center for approximately four years. Each word in a document was matched against a dictionary provided to check its spelling. Program output was a list of unmatched words (potential misspellings), suggested correct spellings and a copy of the original text with the unmatched words highlighted. Proofer also allowed users to provide their own dictionary, which could include frequently used proper names as well as technical and other specialized terms not found in an ordinary dictionary.

Current Spelling Checkers. Proofer was the forerunner of the current

ILLUSTRATION BY RICH TENNANT

spelling checkers in the IBM Displaywriter and 8100/DOSF system. Because the production versions of Proofer use separate dictionaries for roots, prefixes and suffixes, they offer reduced storage space requirements and an accelerated checking process.

The spelling checker provided in the 8100/DOSF system can accommodate 120,000 words; the basic dictionary is provided by IBM and can be expanded by system users to contain names as well as technical terms, acronyms or abbreviations. When mismatches are found, the program highlights the words and suggests probable correct spellings. Users also have an option to enter their own corrections, although the system usually provides the correct spelling.

In addition to locating grammatical errors, Epistle detects poor writing style.

One disadvantage of the spelling checker is that any word that is properly spelled, but misused, is not regarded as an error (for example, principle and principal, immanent and imminent). Regardless of this shortcoming, spelling checkers correct most errors.

Epistle. An experimental software project at the Thomas J. Watson Research Center, Epistle ensures a text's grammatical correctness by parsing each sentence; that is, breaking a sentence into its components for analysis. First, each word is matched against a dictionary to verify its spelling, although the wrong words may be matched. Epistle then retrieves (from the dictionary) codes that describe the word by, for example, its part of speech (such as noun, verb, pronoun), tense, person, number and case.

Epistle attempts to build a parse tree of the sentence according to approximately 250 grammatical rules. If the program succeeds, the sentence is grammatically correct. If the sentence cannot be parsed correctly on the first attempt, the program continues, using relaxed rules. Once the sentence is parsed, the relaxed rules allow the program to locate and diagnose the errors as well as suggest corrections.

In addition to locating grammatical errors, Epistle detects poor writing style. Epistle, which has been used in a laboratory environment for approximately two years, should be available in an experimental version when a program rewrite is completed. The current version uses 4M bytes of memory and an average of 10 CPU-seconds per sentence for a 3033 running under VM/370. The rewrite is expected to use considerably less CPU time and to require approximately 500K bytes of memory. If marketed, Epistle will probably run on a host system; it is unlikely that a product using so many resources will ever operate on a word processing system.

Terminals: Certain basic capabilities are prerequisites for a principal's workstation; others can be added later.

There are three primary requirements.

First, a principal's workstation must provide access to host services and data bases. If principal productivity is to improve while information is to be relayed electronically instead of by paper, principals must at least have read-only access to the online corporate data bases related to their responsibilities. Newly developed

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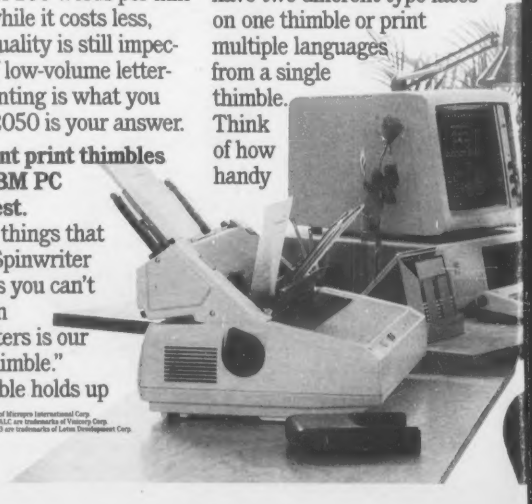

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support software for the principal must reside at the host level. This software will have large memory requirements, require powerful CPUs, or will have to access centralized text files or host data bases. In addition, principals must still access existing host services (for example, TSO, CMS and a conventional host-resident application system).

A principal's workstation must also be able to access those office services provided at the shared-logic system level. In the IBM 8100/DOSF system (with Disoss located at the host), a principal's mailbox, follow-up and message files and WP software are located at the 8100. Many future principal support services will also be implemented at this level. Finally, a principal's workstation must provide personal computing services.

The demand for personal computing will continue to increase as personal computers become more powerful, additional software is available and prices continue to fall. The average principal is currently more interested in personal computing than in such automated office services as electronic mail. A workstation that does not include personal computing will compete with a personal computer for desk space. Because of its obvious and immediate value, however, the personal computer will likely win such a contest.

The second-generation principal workstation must be integrated with the principal's telephone; provide a dot-addressable display (probably color) for charts, graphs and drawings; and include the ability to annotate text documents with voice. Eventually, the principal's workstation may incorporate video and allow voice recognition for instructions, commands and text creation.

Although no completely acceptable terminals are currently available, several products are presented in the following sections.

IBM. IBM's primary product is the conventional CRT. With the 8100/DOSF system used at the shared-logic level and an 8775 CRT, 3270 access is provided to host systems, WP software on the 8100 and follow-up files and mailboxes. The CRT has no personal computing capability and is expensive for widespread use as a terminal for principals.

Northern Telecom, Inc. Displayphone — an integrated telephone and CRT with a full keyboard — may have considerable market potential because of its price; in quantity, it can be purchased for approximately $1,500. This offering, however, can only talk to a host as a dial-up asynchronous terminal. It cannot emulate a 3270 or access WP software, and it has no personal computing capability.

Datavox Communications, Inc. Datavox offers an integrated CRT, full keyboard and telephone. This product's primary advantage over the Displayphone is that it fully emulates an SNA 3270 and can access the host. If connected to an 8100, the terminal can access the host in pass-through mode as well as mailboxes and follow-up files on the 8100. Because it does not emulate a 3732, this offering cannot access WP software and does not have personal computing capability.

Xerox Corp. Star, a sophisticated terminal that uses graphics, has personal computing capability

A workstation that does not include personal computing will compete with a personal computer for desk space.

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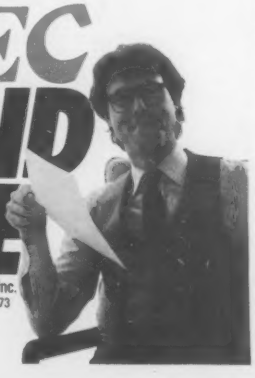

NEC Information Systems, Inc.
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and WP software. If connected into an Ethernet local-area network, it can access mail, files and other office services.

This terminal's greatest disadvantage is cost; the most expensive personal computer is approximately half the price of a Star terminal.

Personal Computers. In addition to offering personal computing, many of these terminals permit access to the host as dial-up asynchronous terminals, and some can emulate an SNA 3270. In the author's research, no personal computer was found to include good WP software or to provide the terminal with the emulation needed to access existing systems (the IBM 8100/DOSF).

Forecasts and Prototypes. As an example of future workstations, the first-generation IBM principal terminal will likely be a personal computer that is modified to access host computers as an SNA 3278 attached to an IBM 3274 or 3276 controller and to access a shared-logic WP system and emulate the appropriate terminal. A personal computer that is modified to attach to the 8100 loop specifically and that can emulate both a 3278 and 3732 will provide full host, WP and Disoss-based office service access while retaining its full personal computing capability.

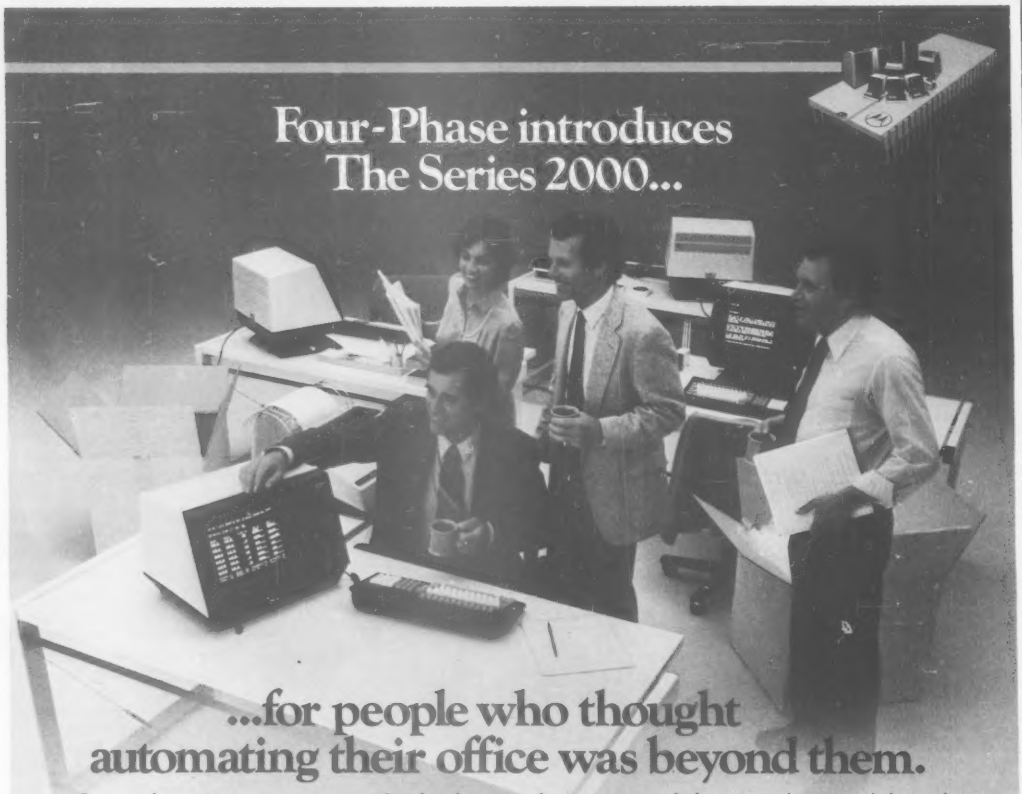
The IBM Research Laboratory has developed several professional workstations that are classified under the generic title "9 to 5." Each workstation — designed to the needs of specific professionals — is a desk with built-in electronics and devices. The "9 to 5" has up to three CRTs, five microprocessors and data communications capabilities and storage. Depending on the principal's needs, the CRTs range from the conventional 3270s to large-screen, fully dot-addressable graphics displays. Although it is unlikely that the current "9 to 5" version will be offered as a product, the project is providing IBM with insight into what capabilities a principal workstation must have.

The first-generation IBM principal terminal will likely be a personal computer modified to access host computers.

Automatic Filing: Today when a document is electronically filed in a system like Disoss, the indexing must be specified. The filing criteria can be author (sender), recipients, copied parties, date, title or document names, subject and keywords selected from the text. This decision is usually at the discretion of the individual responsible for filing. The filing criteria are usually minimized because all such information must be rekeyed, even though this data has been keyed as part of the document.

Because the advent of principal terminals will necessitate the retrieval of documents by both senders and recipients, the documents should be filed under all criteria. This is accomplished easily if the system automatically files the documents and selects the criteria. Initially, the problem of selecting the filing criteria by program seems enormous. It would be unrealistic to require a format that places copy lists, sender's name, subject and date into prescribed locations, since individuals and organizations tend to prefer their own formats. Not even a rigid set of rules can make all documents fit a standard format.

If a document is run against a spelling checker, the words indicated as possible misspellings (not true errors) can be used as



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words, dates (regardless of how they are expressed), words beginning with a capital letter (if not at the beginning of a sentence) and all underscored words. Such modifications would add the words from the title, each proper noun and date to the list of words selected. Although such a program might select many keywords, the document would be filed once, with an index entry for each keyword. Since each individual would choose different keywords, too many keywords are probably better than too few. Automatic filing programs can be expected in the near future.

Integrated Text and Graphics: The principal may also soon benefit from the use of integrated text and graphics systems. Examples of such systems currently under development are the IBM Janus and Sherpa projects.

IBM's research project Janus is primarily a formatter similar to DCF or Script/VS; it uses general mark-up language (GML) tags. The Janus formatter differs from others, however, because it is interactive (a batch run is not required). Janus uses two displays: one CRT is a 3270 that shows the GML, and the other is a large, completely points-addressable graphics CRT that displays the document's actual appearance. As the operator pages one CRT, the other keeps pace with it; both screens use the same GML. The displayed document should appear exactly as it will on paper, including text charts, special symbols or type, photographs, special type and logos. A change to the document is immediately reflected on the screen.

Portions of a document can be enlarged, reduced, or moved by using a keyboard and joystick. For example, an 8-by-10-in. drawing can be input to the system, named, displayed, reduced to approximately 2 by 2½ in. and inserted into the middle of a column of text on a multicolumn 8½-by-11-in. page. Janus retains text in character-encoded form and nontext in digitized form; it can intermix both. By retaining character-encoded text, such other systems as text editing software, spelling checkers and possibly Epistle can be run against the text. Text and digitized data are maintained in separate modules. Digitized data modules can be established from input scanners or programs that generate graphs or line drawings; encoded text is taken from page readers, keyboards or text files.

The primary display in Janus is a completely dot-addressable, large-screen CRT. IBM is experimenting, however, with a completely dot-addressable, laser-activated liquid-crystal display that is potentially more cost-effective and may permit some limited color.

Although Janus is not a well-integrated single system, the current version is valuable in many specialized text applications.

While Janus is innovative, it still requires an inexpensive printing device that has completely dot-addressable output. The printing device must include a duplex printing capability; handle intermixed character-encoded data, digitized images and various fonts; and print multiple, precollated document copies. Project Sherpa — a microcomputer whose memory has a single plug connection to an IBM 6670 communicating copier — is such a printer. The Sherpa box controls the 6670's laser and converts it into a completely dot-addressable printer. Sherpa permits the 6670 to be used as an input scanner and dot-addressable printer. This project is expected to be offered as a product in the near future because of its obvious benefit.

Sherpa's ability to drive any raster-scan device permits its use with a variety of devices. For example, IBM is experimenting (independent of the Sherpa project) with a four-color, drop-on-demand ink-jet printer that is potentially drivable by Sherpa, whose quality is impressive.

As a result of an IBM contract with Mitel, Inc., IBM presumably will enter office voice communications with an electronic PBX. Such a PBX will possibly be based on 8100 technology combined with a 64K-byte chip and Mitel-supplied voice technology.

IBM will probably also announce a local-area network based on its submission to IEEE, although such an announcement may follow IEEE's ruling on its acceptability as a standard. When the local-area network is announced, most IBM support for the higher-level protocols will likely be in the Systems Network Architecture (SNA) environment, with the local-area network protocol operating at the physical layer in SNA. Within the next five years, voice recognition may be developed for use with commands or instructions to an office system terminal. The ability to dictate text to a WP system, however, is probably at least 10 years away.

IBM may introduce voice-annotated text shortly after its private branch exchange (PBX) is announced. The PBX could tie a voice store-and-forward system (Series/1-based ADS system) and a text delivery system (the Disoss 8100 combination) to provide voice-annotated soft-copy text.

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Kelsch is a senior technical specialist on the special projects staff reporting to the vice-president of computer and communications services at Eastern Airlines, Miami. Kelsch has more than 27 years' experience in all facets of DP and is currently a member of The Guide Futures Steering Committee.

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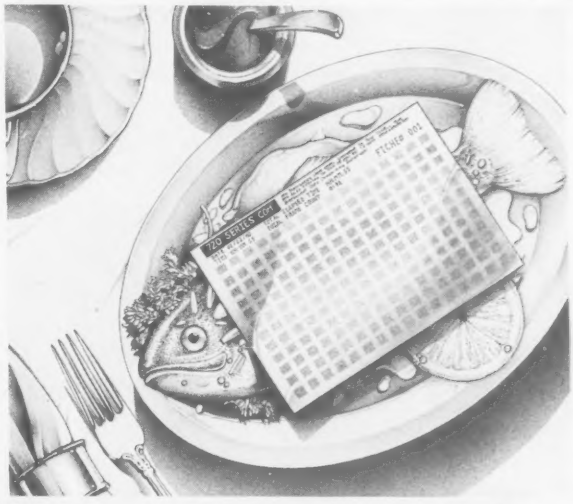

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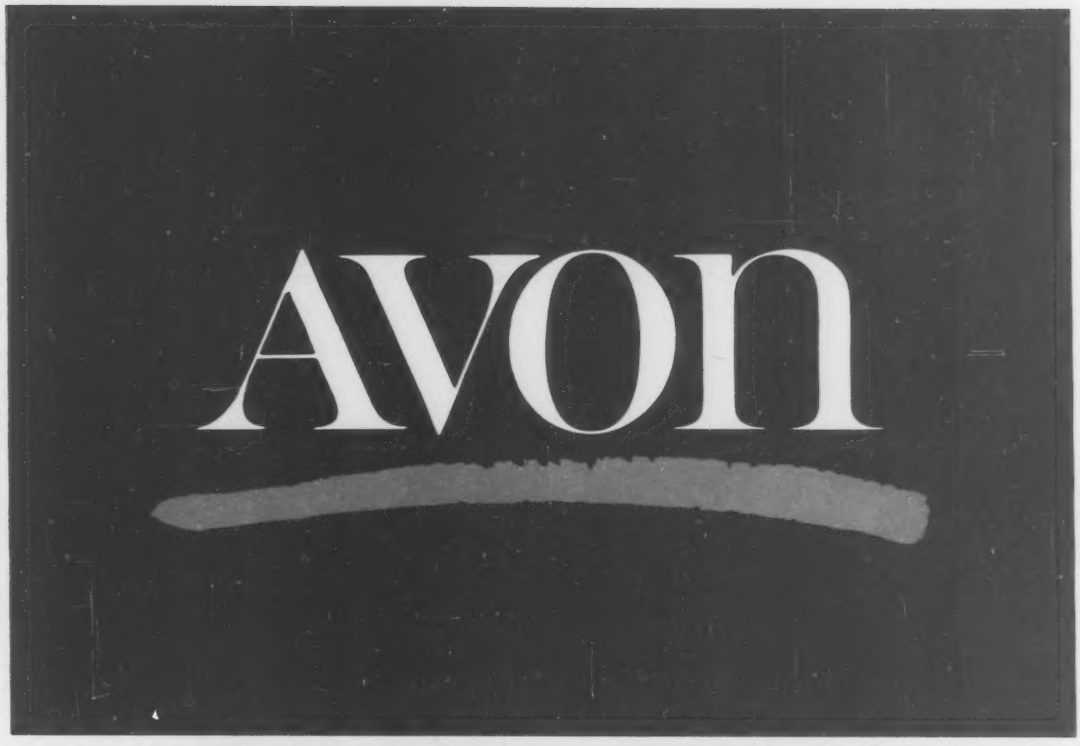

With 1.3 million door-to-door sales reps needing home office support, Avon has had to call on OA in a big way.

By Glenn Rifkin

In 1886, when David McConnell sent out the first Avon lady to ring America's doorbells, he probably had no idea what he'd started. For the time, his ideas were considered radical. Instead of selling the usual door-to-door fare like books or snake oil, McConnell's new company sold cosmetics. Instead of traveling salesmen, Avon had local women selling to their neighbors and friends.

Nearly 100 years later, McConnell's innovative idea has become a legendary fixture in American industry. Avon Products, Inc. is now a $3 billion corporation with 30,000 employees, offices in 32 countries and more than 1.3 million representatives selling Avon merchandise around the world.

In order to support this enormous direct selling network, Avon has taken a strong initiative in communications and office systems. With a solid mandate from the executive level and a user population that simply can't get enough, Avon's office automators are just trying to stay one step ahead of the demand.

And as Avon prepares to move its corporate headquarters from Manhattan to brand new facilities in Rye, N.Y., beginning in 1984, that demand has already increased dramatically. The potential of a new building, able to be designed and integrated from scratch, has whetted OA appetites from the executive suite to the word processing department.

John M.Hart, manager of office systems at Avon, pointed out that the enthusiasm for OA was not always this high. In fact, office automation at Avon made its initial entry with a small, single project in 1979 when the company decided to internalize and automate its letter-writing capabilities. The company needed frequent and rapid communications with its 400,000 U.S. sales representatives. Avon had an outside vendor sending all those letters, to the tune of about $500,000 annually.

Hart and his boss, Tom Byrnes, director of communications and office systems, agreed Avon should standardize on a single vendor. They settled on Wang Laboratories, Inc. and, for the letter-writing process, chose the Wang WP-30 system. Initially, the letter-writing procedure was only marginally successful. "We weren't able to impact a lot with three operators and eight printers," Hart said. The next step was to create an interface with Avon's IBM mainframe. That successful interface solved the throughput problem, but an output medium was still needed. After nearly 400 telecommunications experiments, the group successfully interfaced the

Wang system with an IBM 6670 laser printer. Hart said he believes Avon was possibly the first to accomplish that linkup.

Upon installation of the system, the group increased its output from 1,200 letters per month to the current 16,000 letters per day. After more than four years of successful use, the Wang WP-30 system is being replaced by the Wang VS system. When that is installed, two IBM 6670s will be able to do concurrent processing, and Hart predicted the system will turn out 30,000 letters per day by the first quarter of 1984.

In the four years since the letter-writing project was initiated, OA has spread widely throughout corporate headquarters, six U.S. locations and 32 international offices. Virtually every department from the controller's office to the treasurer's department uses WP, office information systems or personal computers for report-writing, file maintenance, tracking, training and countless other applications. Although unwilling to reveal the total OA budget, he said OA expenditures will grow significantly with the move to Rye.

The information services department, part of the DP department, has acted in an advisory role to anyone seeking a system. Working under Rainer Paul, vice-president of information services, Byrnes and his group of managers meet weekly to discuss the many requests, agree on the solutions and dispense the work to the proper people.

Many of the systems are based on WP, but Hart pointed out that the applications quickly go beyond that. "What's happening in many cases is that we're putting in systems for specific functions; along with that function, the group gets electronic mail, calendaring, messaging, tickler files and all the other management support systems. They won't be required to use all those applications, but we will train and support them on the systems. Hopefully, through that kind of encouragement, they will use it."

Apparently, the encouragement has already paid off. The user environment has changed dramatically at Avon over the past three years. According to Hart, the users know exactly what they want and it's much more of a participatory situation now. He also produced a 20-minute videotape, using Avon employees as the actors, to explain what OA will do for the company and the individual. The tape, shown to groups throughout the company, has assuaged many of the fears that OA sometimes generates.

Increased user involvement has significantly streamlined the work for the nine members of Hart's group. Rather than becoming totally immersed in each project, Hart's people can determine the needed system, put together cost-justification and route the idea for approval without doing a step-by-step analysis. This has allowed his staff to concentrate on more complex projects.

For example, they are currently putting together a product development system that will tie together five departments. Product development usually takes about two years from idea to market. "During that two years, you can imagine how many decisions are made, how many times they are revised and how much information is passed around," Hart said. "Three of the departments came to us separately and asked for help. We looked at what they were doing and realized these people were working on the same thing. We found the five key departments and are now putting together a loop. We anticipate there will be as many as 24 departments that will share

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the information when we are finished."

Information services believes it can save Avon several million dollars by putting in this system. As OA has proliferated at Avon, management has supported the concepts, but has sought cost-justification for all systems installed. That, however, is not rigid. It's very rare for a system not to get a good return on investment (Avon normally expects a two-year return on investment), according to Hart. However, if the business application is essential, it will be installed, cost-justified or not. Despite that, for Byrnes cost-justification is the biggest challenge to OA implementation. If a system saves a professional a half hour per day, will that time-savings translate into dollars or staff reduction, he asked. "It is difficult

Information services believes it can save Avon several million dollars by putting in this system.

at times to explain the intangibles to management — that the technology will help do a better job. What they see is that we're spending a ton of money on it, and they want to know what it will do."

Management's skepticism has not, however, caused any serious delays in implementation. In fact, information services has grown so rapidly it has outgrown the Manhattan headquarters. Ed Rochotte, an Avon consultant on communications, pointed out that most of the implementation delays have been caused by Avon's landlords. Before anything can be installed, written permission must be received from the building's owners. The automators, therefore, are quite happy to be moving to facilities owned by the company.

The move to Rye will be accomplished in various phases over a span of several years. Avon has 15 more years on its lease in Manhattan, so the top executives will remain there indefinitely. The first phase of the move will involve 600 people, including information services.

Hart has already initiated a pilot project for Rye that will provide an opportunity to preview Avon's office of the future. The pilot, which will initially affect about 100 employees, includes technology and applications that were impossible to institute in Manhattan. He said it will give Avon a chance to see whether OA will do what it's been advertised to do — specifically, whether the technology translates into bottom-line savings.

The pilot has also provided Avon the chance to expand its OA program to a two-vendor environment. For the pilot, Avon turned instead to Digital Equipment Corp. Byrnes said DEC's ability to tie together equipment from many vendors enticed them to the Maynard, Mass. company.

The initial pilot includes both the DEC All-In-One system and the Decmate II personal computer tied to a VAX minicomputer in the Rye facility. The pilot involves six Avon departments and has attracted much attention from the executive level, including several requests for involvement in the pilot. Hart said that attention is welcome because those people ultimately make the final OA decisions.

The information services group hasn't sat back waiting for the move to Rye, however. The goal, according to Byrnes and Hart, is to provide access to the technology for anybody who needs it and to get end users to understand what that technology can do for them. Three years ago, the DP department initiated a technology task force comprised of six corporate officers whose mandate is to fund experiments, pilot programs and to "get things going."

During the past year, the OA push has taken off. A company-wide technology fair was held for employees in July 1982. Henry Mah, manager of personal computing, organized the fair, in which 23 vendors displayed their wares and more than 1,600 Avon employees got hands-on experience — many for the first time. The response, Mah said, was overwhelming. To meet the resulting demand for more information, he opened the Creative Learning Center.

The center, which contains virtually every major personal computer on the market, has served as a training site for more than 600 employees since its inception. Employees can get training for both business-related and personal interests. "I went in one day and saw the chef from the executive dining room taking a personal

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computer course on an Apple," Hart said. "It's wide open."

The center has been so successful that the concept is being expanded to include most of Avon's worldwide facilities. A personal computer users group has also developed which Mah hopes to tie into the center.

Mah is also responsible for Avon's information center, which offers time-sharing facilities off a Burroughs 5900 mainframe. With personal computer training, the information center, and the IBM mainframe environment, Avon's users now have three choices to get on line.

"We used to do a lot of handholding," Hart said. "They expected a person to come with the personal computer. The fair really changed that. It really lit the fuse around here."

"DP is not the bad guy around here anymore," added Mah. "The employees feel good about doing the work themselves. We are definitely setting the trend."

Under Mah's direction, Avon has standardized its personal computer environment with the Eagle, IBM and Apple. Any requests for purchase of a personal computer must be approved by Mah. "The bulk of the use is for spreadsheet, data base management and word processing. We're installing about one per day and the demand is unlimited," he said. The Eagle is currently being field tested; if the tests prove successful, all 2,500 district managers at Avon will have Eagles on their desks.

As the personal computer makes its presence felt at Avon, the information services department is looking for the best ways to tie all this computing power together. Rochotte has spearheaded a search for a local-area network to install in the Rye facility, a search that has thus far been fruitless.

"We've looked at everything — Ethernet, Wangnet and others — and we haven't seen anything we wanted. We're hoping somebody will have what we're looking for soon. We're running a spare length of twisted pair in Rye so we can install the network when we find what we want," Rochotte said.

Avon is keeping an eye open for virtually anything that will help link people together with technology. Videoconferencing, video disks and videotex are three areas now receiving a closer look. Videotex is especially attractive to Avon because the direct-selling giant is "vitally interested in shop-at-home services. We look at OA and if there is anything at all that can be related to Avon, we go after it. There are no holds barred," Hart said. "We like to stay ahead of the technology, but we don't need to be pioneers. We want proven systems," Byrnes added.

Avon is also concerned that these proven systems receive the proper service and support. When a mix of vendors is involved, the potential problem arises of where the responsibility lies should something go wrong. The information services people don't want that responsibility to be dumped on the end user.

'We look at OA and if there is anything at all that can be related to Avon, we go after it.'

The spread of computing power through office automation has also caused great concern about data security. Mah pointed out that access to corporate data bases is going to be limited to time-sharing users downloading from the mainframe. From time-sharing, the user will get only summary data. A user who wants to download to a personal computer will need vice-presidential approval.

"We've made a big commitment to security. There haven't been problems yet, but we want to make sure that none come up," Byrnes said

In reality, the single biggest problem Avon's office automators face is keeping up with the demand. Management, for example, is so supportive that it is almost too supportive, said Hart. Having been on line to the IBM mainframe for years, and having seen the automation of Avon's factories, the company's executives are as anxious as anyone to reap the rewards of OA. "Instead of saying, 'Why did you do this?' they are asking, 'Why aren't you doing this?' I can't work fast enough for them," said Hart. "It's a tremendous atmosphere here."OA

Rifkin is a staff writer with Computerworld OA.

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Telefailure Or Telefuture?

Voice message systems haven't taken off yet. With the right idea, however, they can be of benefit.

By Steve Glagow and Walter Ulrich

In 1980, forecasts said store-and-forward voice systems would take the world by storm. Three years later, probably only 100 or so installations exist — and many of those are just pilot systems. Although voice mail systems do have a place in most businesses, the original expectations were often naive; implementors did not have a full understanding of how voice mail should be most effectively introduced.

This article will discuss why voice mail is important and how it should be implemented. It will also list product characteristics of several voice mail vendors and provide evaluation criteria for the selection of voice mail systems.

Briefly, voice mail systems are computer-based systems designed to store voice messages digitally. The sender enters a voice message by means of a telephone handset. The natural voice is then converted from analog to digital and stored on a disk or another storage device. Normally, 32K bits of storage are required for each second of human speech. Messages

	Price Range	Year Founded	First Shipped	Companies Using System	Minimum/Maximum Ports	Users per System	Maintenance	Control Reports	Networking	Interface With PBX	Class of Service Restriction	Out-Dialing Local And Long Distance
VMX	$ 14,000 - $525,000	1980	May 1980	105 Pilot or rental, 25 installations	June '83 (8-64) 16-64	500-8,000	Remote (remote diagnostic)	Yes	Yes	Yes	Yes	
IBM	Hardware only $ 99,000 $219,000	1924	September 1981 (announced)	NA	1-10	100-1,000	Yes, nationwide by IBM	Yes	No	Yes	Yes	Yes
Wang	$125,000 - $246,000	1951	1981-1983	NA	4-32	200-4,800	Yes, Wang OIS145 remote diagnostic	Yes	Fall '83 Wangnet	Yes	No	Yes, unlimited
EVX	$160,000 - $220,000	1978	1981	NA	2-32	500-5,000	Nationwide via ITT self diagnostic with UPS & modem	Yes	No, future	Yes	Yes, user controlled	Yes
Rolm	$ 70,000 -	1969	1983	4 (Beta test sites)	8-16	100-800	Yes	Yes	Yes, through PBX	Yes	Yes	No
Voicetek	$ 49,500 - $169,500	NA	NA	NA	2-32	100-2,000	Yes (remote diagnostic)	Yes	No, (X.25 possible early '84)	Yes	Yes, limited	No, fall '83
Voice Mail International	$ 85,000 - $250,000	1980	Late 1983	—	4-16 Vax-based 256 ports 1984 April	200-5,000	Yes (by December)	Yes	End of year	Yes	Yes	Yes, restricted on service 20 digit

In almost every organization, ample opportunities exist to use voice mail technologies to solve a specific information or communications need.

are then forwarded to recipients through either a mailbox system or a call-back system. In the mailbox system, a recipient telephones into the voice mail system, enters a password and plays back the message. In a call-back system, the voice mail system actually dials the recipient's telephone number; when contact is made, it plays back the message.

Because the systems are computer-based, the person receiving the voice message can review it and then decide whether to replay it, save it for later, discard it or forward it to another party. Voice messages can also be edited. Furthermore, a voice message can be recorded once and sent to several people at the same time.

Voice mail systems receive their commands in the form of tones generated when the keys on a standard 12-key telephone pad are pushed. Pushing the right key will inform the system you are ready to record a message or instruct the system to stop recording, skip backward or skip forward when replaying a message. All voice mail systems help the user remember which keys to push. Some provide templates that fit neatly over the telephone face. In others, the system actually prompts the user with the choice of keys that can be played next. Several systems offer a combination of both.

No special terminals are necessary. The system can be used from the office, from the home and while traveling. It provides convenient communication and preserves the natural tone and inflection of the speaker's original message.

Voice messaging has not grown as fast as was predicted three years ago. Its lackluster performance has been attributed to the sluggish economy, lack of user-friendliness, user fears of being recorded and the relatively high cost of early systems. Each of these reasons has played its part. More important, however, the early systems were marketed in the wrong direction.

Productivity was the popular buzz word among business people in 1980, and voice mail systems were marketed to improve the overall productivity of the office. Typical cost-justification scenarios had to calculate how many minutes of each person's time were wasted on the telephone. The time that could be saved by using voice mail was then multiplied by some hourly rate. The net results, plus other general office productivity improvements, were calculated. From that figure, the amortized cost of the store-and-forward voice system was deducted; the result was the net benefit. The numbers often looked impressive, but there was really no way to tie down the benefits and measure the results. The benefits were incremental rather than specific.

In addition, voice mail pilot projects were not always convincing. The number of users in a pilot was usually quite small; without a significant threshold of users on the system, most communications still had to be done using traditional methods. When a voice mail user checks his mailbox for several days and finds no incoming messages, he is easily discouraged. Small pilots are not a fair test and, as might be expected, the results from some were less than spectacular. Even though voice mail systems have real strengths in the general office environment, pilots are not a satisfactory approach for introducing them into the business community.

In the computer industry, an analogy can be seen in the first computers, which were not designed to improve technical productivity. They were designed to perform some specific ballistic calculations that were otherwise overwhelming. Early business computers weren't designed to improve business productivity. They were sold to meet a specific application requirement — more often than not, accounting. Computers were sold successfully in the '50s not because of some inherent improvement or benefit, but because they met the needs of specific applications.

Voice mail should be sold the same way. The marketing of store-and-forward systems should be done on an application-specific basis. In almost every organization, ample opportunities exist to use these technologies to solve a specific information or communication need.

The following statements describe a number of applications well suited to voice mail:

- **"One individual to many" or "many individuals to one."** If one person must reach several people in a short time, or if a large number of people are trying to reach a few people in a short time, voice mail should be seriously considered.
- **Telephone tag.** Voice mail is a good candidate when people have a hard time reaching each other for specific, time-critical applications.
- **Brief messages.** Voice mail is

	Intramessage Delivery Option	Message Desk	Future Delivery	Edit Functions	Broadcast Abilities	Time/Date Stamp	Receipt Acknowledged	Message Forward	Help Keys or Audio Prompt	Speed Control	Security Levels	Maximimum Message Length	Welcome By Name
	Voice mail calls user	Yes	No (set for fall '83)	Stop, start 10 seconds backup, 10 seconds forward	Unlimited	Yes	Yes	Yes	Audio prompting	No	12-digit access, 5-digit security	Unlimited (by adding)	No
	Yes	Yes, but not set up for outside calling	Yes	Yes, includes all	10 by 10	User option	Yes	Yes	Audio help keys	Yes	8-digit access, 4-digit security	350 seconds unlimited	Yes
	Yes, very good	Yes	Yes	None	32 by 8 maximum	No	No	Yes	Audio prompting	No	5-digit ID, 5-digit password	6 minutes unlimited	No
	Yes, via outdial light on phone	Yes, call forward to EVX or operator control	No	Start, stop	20 people on list, replay to next list, unlimited	Yes	No, yes in R&D	Yes	Yes, audio with help key	No	4- to 6-digit access, 2-digit security, 6-digit forward	EVX 100 7 minutes only, longer	No
	No	Yes	No	Yes	50 by 10, 500 maximum	Yes	Yes	Yes	Yes	No	12-digit access 8-digit security	Unlimited	No
	No, fall '83	Yes, attendant transfer only	Yes	No, replay only	Unlimited	No	No	Yes	Audio prompting	No	12-digit access, 5-digit security, account code	Unlimited	No
	Yes, user controlled	Yes	Yes, up to 9 days in advance, retry on delivery	No edit before send (but could program)	255 maximum	Not announced, will tell on press of button	Yes	No	Audio prompting	Replay only	7-digit access and security levels	Unlimited	Yes

In selecting a voice mail system, a user should weigh each criterion according to its ability to fill a particular need within the company.

particularly suitable for brief and simple messages. In addition, voice mail can be used as a voice "bulletin board," where longer messages are quickly distributed to a large number of people.

• **One-way messages.** Voice mail can be used to give answers to requests or to request information. Voice mail is not well suited, however, for complex exchanges of information, such as negotiations or lengthy discussions.

Developed by Gordon Matthews, the first voice mail system was marketed by VMX, Inc. (formerly ECS Telecommunications, Inc.). Over the past three years, several new vendors have either introduced or announced voice store-and-forward products. On the basis of feature, function, quality, marketing know-how and price, voice mail is highly competitive. In fact, some vendors that were contemporaries of VMX have recently gone out of business.

The proper selection of a voice mail system is extremely important. Different systems have different strengths and weaknesses, which should be matched to the needs of the user company. A system that would be successful in one organization could be an outright failure in another.

Selection should be based on a variety of criteria. To demonstrate how the selection process works, I have selected a sample of several voice mail vendors and rated their products by these criteria. The list of vendors is in no way meant to be complete. Furthermore, depending on the circumstances, additional criteria might be added in making a selection for a specific client. Nonetheless, this should provide a starting point for doing a voice mail analysis.

Twenty-five selection criteria were developed, and seven vendors were evaluated on how well they met each criterion: VMX, Inc., Wang Laboratories, Inc., EVX, Rolm Corp., IBM, Voice Mail International and Voicetek Corp.

In selecting a voice mail system, a user should weigh each criterion according to its ability to fill a particular need within the company. Each vendor performs a similar criterion with a slight variance.

The following is a list of selection criteria and definitions applied in the evaluation:

• **Costs**: Voice mail systems range from $50,000 to $500,000.

• **Number of Ports**: Voice mail systems can start with as few as two ports and have as many as 256 ports. (Ports are used for incoming trunks and other peripheral equipment such as printers.)

• **User Range**: User range is the minimum and maximum users a system can support, both initially and upon completed implementation. Some systems provide for as few as 100 users; others can support up to 20,000 people.

• **Maintenance**: The ability of the voice mail vendor to supply maintenance for the recommended voice mail system, hardware and software.

• **Control Reports**: Voice mail systems generate valuable reports, including accounting functions and various other business-related reports. These reports could be used by a system administrator for maintenance and billing.

• **Networking**: The ability of the system to network or communicate to other voice mail or DP equipment. This could be an important criterion if the company has multiple locations.

• **Interface with Private Branch Exchange (PBX) System**: Voice mail systems are capable of interfacing with PBX systems, using either analog or digital technology.

• **Class of Service Restrictions**: Class of service restrictions is the capability of the voice mail system to monitor and control out-dialing and other services the system has, either limiting or enabling a user to utilize all services of the voice mail system. Restrictions are important in separating specific uses for different employees.

• **Out-Dialing**: Out-dialing is the ability of the voice mail system to automatically dial an outside call (local or long distance) to deliver a user's voice mail message to another user or nonuser of the voice mail system. This function would be especially helpful in contacting a nonuser or user during nonbusiness hours or weekends when people tend to fail to call their voice mailboxes.

• **Intraoffice Message Delivery**: Intraoffice message delivery is the ability of the system to autodial a user at his station (extension) or a call-forwarded number to deliver a message left in the mailbox. This option should be user controlled. This function would deliver the message immediately or at a prespecified time directly to the addressee's phone.

• **Message Desk**: With the message desk option, an operator attendant can transfer a voice mail message from a nonuser, or an outside user can establish a voice mail message in the system. This would be important if nonusers want to use the message system.

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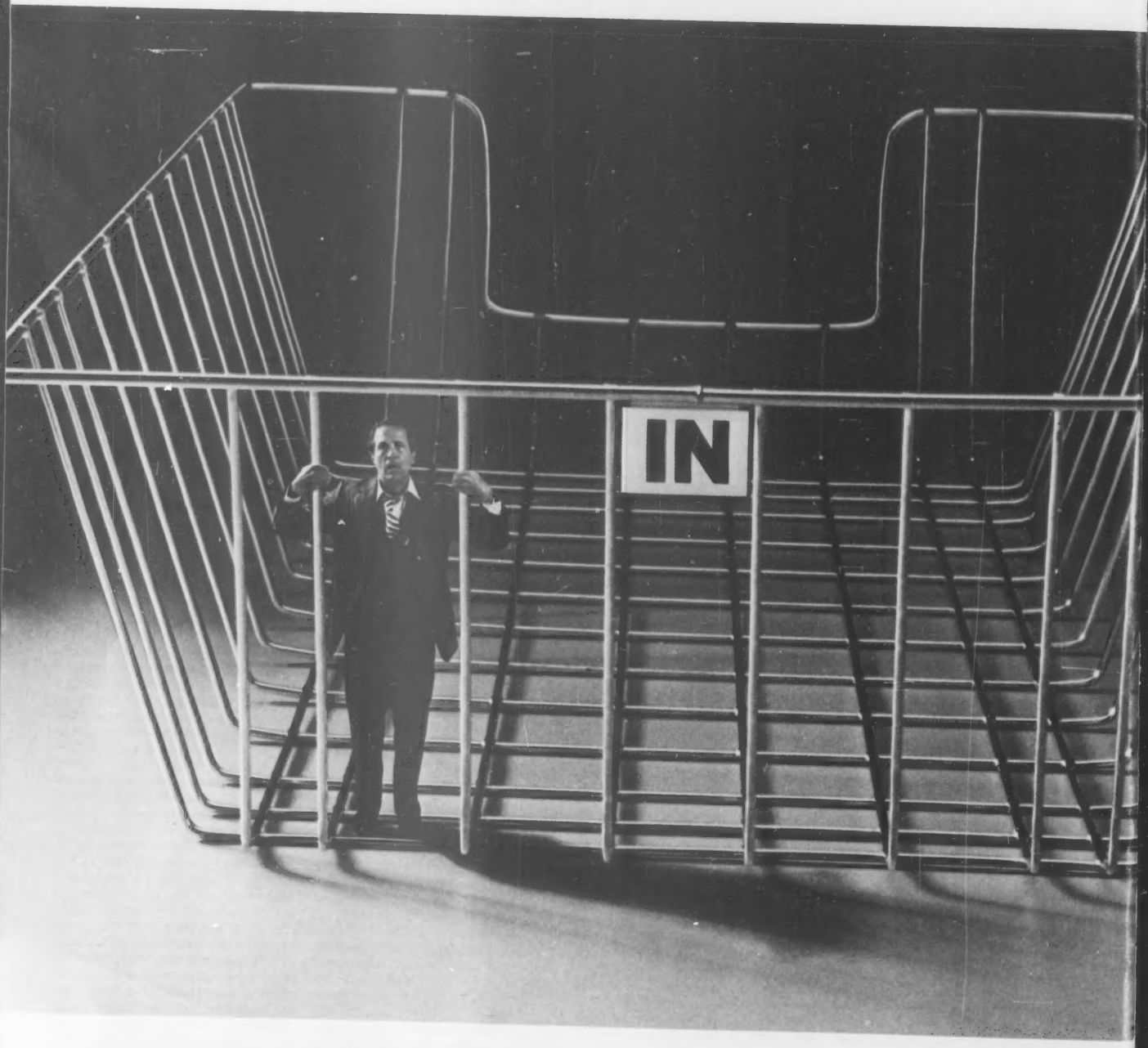

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• **Future Delivery**: This capability lets a user create a message and send it at a predetermined future time to another user of the system, either by dropping it into a mailbox or by outdialing it. This function would be used with out-dialing and intraoffice message delivery. By using night rates, the capability could offer big savings on long-distance messages. It also offers help with time-zone problems and can call and remind a user of a meeting or appointment.

Edit Functions: Edit functions include stop, start, skip forward, skip backward, delete, reply, add and subtract. The edit function is important for new users who want to become at ease with leaving a recorded message. The user could replay a message and edit it until he becomes comfortable with it. This function is important when numerics are being quoted, and the receiving user may want to stop, replay or slow down.

• **Broadcast Abilities**: Broadcast abilities allow one message to be directed to multiple users and can be a big time saver in announcing a meeting.

• **Time Stamp/Date Stamp**: The time stamp or date stamp describes the ability of the voice mail system to embed a time and date that can be called up by a user to determine when a message was directed to him.

• **Receipt Acknowledgement**: Receipt acknowledgement is the ability of the voice mail system to notify a sender that a user has responded to his message. The benefit offered is proof of delivery.

• **Message Forwarding**: Through message forwarding, a user who has received a message can send it to another user of the system and the user can also add dialog to the first message. This is similar to memo passing.

• **Help Keys or Audio Prompting**: Help keys allow users to request help from the system when problems occur. Audio prompting is the ability of the voice mail system to prompt the user from initial sign-on of the system, through voice mail send and receive, to termination of voice mail use. Everyone will forget a command at one point or another, and this tool helps a user to get started.

• **Speed Control**: With speed control, the user can slow down and speed up the received message. This is a high-end edit function.

• **Security Levels**: Through security levels, the voice mail system can restrict access to the system by requiring an access code and a follow-up security code. The security code should be optional. This will protect the information being passed.

• **Message Length**: Messages can range from a minimum of 30 seconds to an almost indefinite length.

• **Welcome by Name**: This capability lets the system recognize a user by either his access or his security code and establish a verbal recognition by "saying" the user's name. This functions as an assurance you are in your own mailbox.

In summary, the general productivity benefits of voice mail systems are important and real, but the introduction of voice mail systems will depend upon selecting the right applications. Voice mail system selection is dependent upon several criteria, and the system must be matched to the neeeds of the organization. Implementation and training are also critical and must be carefully considered.

It is a complex undertaking, but one that is essential for the technological development of many companies. OA

Glagow is a consultant with Walter E. Ulrich Consulting and Ulrich is president of Walter E. Ulrich Consulting, a Houston-based management and technology consulting firm.

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TECHNOLOGY

LOWELL, Mass. — An entry-level 32-bit minicomputer designed for small to medium-size office environments has been introduced by **Wang Laboratories, Inc.**

The VS 85 is aimed at users who require extra processing power, but lack the office space required by a 32-bit system, Wang said.

The VS 85 includes the 32-bit architecture found in the VS 90 and VS 100, a disk storage capacity of more than 5G bytes, support of 32 concurrent users and an optional cache memory for improved performance. It costs $63,000 from Wang at One Industrial Ave., Lowell, Mass. 01851.

SAN JOSE, Calif. — **Altos Computer Systems, Inc.** has introduced the Altos-Net II system to provide transparent remote file access and remote processor execution in a Unix environment.

The system reportedly saves users substantial disk space by sharing files and provides the benefit of powerful Unix commands throughout the network. It also runs multiuser applications on the network without modification.

The Altos-Net II system supports both the Ethernet local-area net and Altos' proprietary twisted-pair cabling net hardware and costs $495 per CPU from Altos, 2641 Orchard Parkway, San Jose, Calif. 95134.

WOODLAND HILLS, Calif. — Execustation, a processing service that integrates microcomputers with user data on its mainframes has been announced by **Informatics General Corp.** The service links micros at user sites with an Informatics data center in Fairfield, N.J. and was designed for managers in Fortune 1500 companies, major financial institutions and the federal government who have no DP experience.

Execustation software is available for $200 per copy to users who meet the standard monthly minimum charge for mainframe processing of $300 from the firm at 21031 Ventura Blvd., Woodland Hills, Calif. 91364.

WESTBORO, Mass. — A protocol converter that reportedly provides a low-cost easy entry to IBM environments via coaxial cluster controller connection for any Ascii terminal, micro, portable computer or other device, was introduced by **3R Computers, Inc.**

The Avatar PA1000 Protocol Converter connects to an IBM 3274/3276 cluster controller that supports IBM bisynchronous control or systems network architecture/systems data link control environments.

It also permits access to asynchronous hosts and to public information or time-sharing services, locally or remotely. The Avatar PA1000 is priced at $995 from 3R Computers, 18 Lyman St., Westboro, Mass. 01581.

ALLEN, Texas — **Intecom, Inc.** has introduced the Integrated Business Exchange (IBX) S/10, as part of the IBX family of voice/data communication switches. The introduction of the IBX S/10 expands the IBX family to cover line sizes ranging from 250 lines to 12,000 lines. The IBX S/10 reportedly features full voice feature set ranging from individual station features to least-cost alternate routing; full software support for upcoming equal access requirements due to Bell System restructuring; and nonblocking simultaneous voice/data transmission.

The IBX S/10 costs $700 to $1,100 per line depending on network configurations and options from Intecom, Inc., 601 Intecom Drive, Allen, Texas 75002.

PRINCETON, N.J. — **Applied Data Research, Inc.** (ADR) released ADR/Ideal, reportedly the first functionally complete fourth-generation application development system.

Ideal combines relational data base management with an active data dictionary, fourth-generation language, comprehensive workstation environment and facilities for managing the entire application life cycle. Ideal operates in an IBM 370, 4300, 30 series and PCM environments.

Permanent licenses for Ideal are priced at $75,000 for OS sites and $50,000 for DOS sites from ADR, Rt. 206 and Orchard Road, CN-8, Princeton, N.J. 08540.

PALO ALTO, Calif. — **Hewlett-Packard Co.** has announced a display terminal and a word processing workstation. The HP 2625A dual-system display can operate on both HP and IBM systems simultaneously and offers optional HP WP capabilities. The HP 2625A emulates an IBM 3276/78 display station. The HP 2628A is a dedicated word processor that provides WP, DP and graphics.

The HP 2625A is priced at $3,495 and the HP 2628A at $3,195.

HP also introduced two laser printers, the HP 2687A desktop text printer for $12,000 and the larger HP 2688A text and graphics printer for $29,950. A high-performance, six-pen graphics plotter for users of business and professional personal computers was also introduced costing $1,895. HP also lowered the price on its two-pen model by 30%.

Both plotters are reportedly compatible with personal computers from Apple Computer, Inc., IBM and other vendors.

For more information contact Hewlett Packard, 1820 Embarcadero Rd., Palo Alto, Calif. 94303. OA

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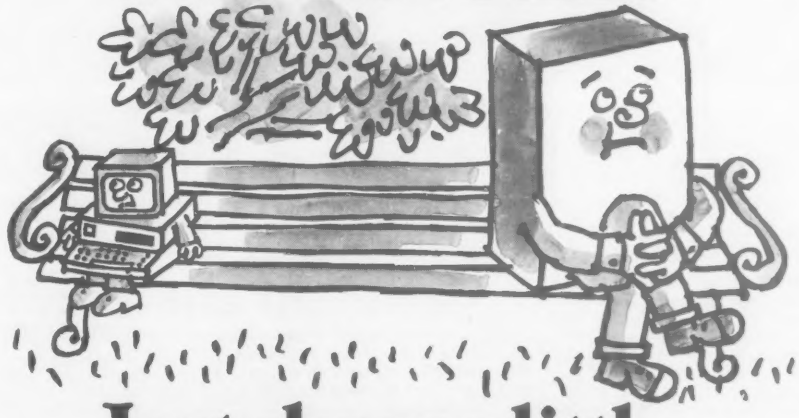

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CALENDAR

Oct. 10-13, New York — **Information Management Exposition and Conference (Info '83)**. Contact: Clapp & Poliak, 708 Third Ave., New York, N.Y. 10017.

Oct. 12-13, San Francisco — **The Changing Role of the PBX**. Contact: Probe Research, Inc., P.O. Box 590, Morristown, N.J. 07690.

Oct. 17-19, Saddlebrook, N.J. — **Personal Computing and Networking**. Also, Oct. 24-26, Hartford. Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Oct. 17-19, New York — **Improving Office Productivity: Principles and Practices**. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Oct. 18, Boston — **Artificial Intelligence**. Also Nov. 1, Los Angeles; Nov. 8, New York; Nov. 28, San Francisco; and Dec. 13, Washington, D.C. Contact: Yourdon, 1133 Avenue of the Americas, New York, N.Y. 10036.

Oct. 17-19, Dallas — **Personal Computers: Strategies for Managing**. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Oct. 19-21, Toronto — **Local-Area Networks**. Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Oct. 24-25, Arlington, Va. — **Dbase II — Data Management for Microcomputers**. Also, Oct. 26-27, Baltimore; Nov. 7-8, Los Angeles; and Nov. 9-10, San Diego. Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Oct. 25-26, New York — **1984 Impact of Divestiture on Users and Vendors**. Also, Nov. 14-15, Chicago. Contact: The DMW Group, Inc., 2020 Hogback Road, Ann Arbor, Mich. 48104.

Oct. 27, New York — **CBX Evaluation and Selection**. Also, Nov. 8, Chicago. Contact: The DMW Group, Inc., 2020 Hogback Road, Ann Arbor, Mich. 48104.

Oct. 30-Nov. 2, Baltimore — **DP Management Association's International Conference and Business Expo (DPMA)**. Contact: DPMA, 505 Busse Highway, Park Ridge, Ill. 60068.

Oct. 31, Los Angeles — **Ergonomics Legislation and Standards in Europe**. Also, Nov. 2, Boston. Contact: Krause & Co., 1325 Columbus Ave. Cottage, San Francisco, Calif. 94133.

Nov. 1-3, Washington, D.C. — **The 1983 Federal Office Automation Conference**. Contact: National Council on Education for Information Strategies, P.O. Box N, Wayland, Mass. 01778.

Nov. 1-3, Chicago — **Intech '83**. Contact: National Trade Productions, Inc., 9418 Annapolis Road, Lanham, Md. 20706.

Nov. 7-8, New York — **Office Systems and the Role of the Personal Computer**. Contact: The DMW Group, Inc., 2020 Hogback Road, Ann Arbor, Mich. 48104.

Nov. 8-10, New York — **Directions in Office Systems and Professional Computing: Which Way to Turn?** Contact: Hammer/Seybold Executive Forum, Suite 801, 44 Bromfield St., Boston, Mass. 02108.

Nov. 14-17, San Francisco — **IMC '83**. Contact: The International Information Management Congress, P.O. Box 34404, Bethesda, Md. 20817.

Nov. 29-Dec. 1, Kihei, Hawaii — **Future of Optical Storage, Videodisks and Computers to the Year 2000**. Contact: Technology Opportunity Conference, P.O. Box 14817, San Francisco, Calif. 94114.

Dec. 1-2, New York — **Telecommunications Strategic Planning Methodologies**. The DMW Group, Inc., 2020 Hogback Road, Ann Arbor, Mich. 48104.

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